MORPHOLOGY AND FUNCTIONAL COMMUNICATION OF THE DEAF

By

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To my very special friends,
Dr. and Mrs. Fred O. Brumfield

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This investigation was conducted to obtain information about two distinct aspects of the communicative ability of the deaf. The first research question dealt with the ability and extent to which the deaf are able to utilize and/or understand the syntax of a natural language (i.e., English). Previous linguistic experiments conducted in the oral or graphic mediums had raised a question as to whether low linguistic scores were the result of true ignorance for a task or difficulty with the testing medium itself.

The functional communicative effectiveness (FC) of the deaf for conveying specific information when allowed to utilize the preferred visual-gestural, American Sign Language (AMESLAN) communication method was also investigated. The second question was to determine the nature of the relationship between linguistic scores and judged level of FC proficiency.

Finally, a demographic study was conducted to determine if linguistic performance or FC ratings were related to the variables of

etiology, dB loss in the better ear, first language in the home, other hearing impaired family members, persons at home who can finger spell and/or sign, age when finger spelling was first acquired, number of years at Florida School for the Deaf and Blind (FSDB), reading level, IQ, age, race, and sex.

The Berry-Talbott Language Tests I: Comprehension of Grammar (BTT), a test of morphology, was administered in two distinct testing situations. One preserved the traditional testing format of graphic presentation and response. The other presented the same test stimuli in a video taped, finger spelling and signed English presentation where the subject finger spelled the response. A paired difference t-statistic revealed a significant difference in correct responses in favor of the graphic presentation.

For the FC rating the subject read a simple paragraph which he retold in his preferred manner of communication. This story was video taped for later scoring by two groups of judges who were fluent in sign and finger spelling. Performance was rated on a general quality scale and on the inclusion of specific main and detail items of the story. Analysis of the Quality Score showed the deaf students to be slightly below average in their communicative ability.

Graphic BTT scores and Manual BTT scores, and Graphic BTT scores and FC ratings were highly correlated at the .01 level. Manual BTT scores and FC ratings were not correlated.

Regression models were developed for prediction of the variance within the dependent variables Graphic BTT, Manual BTT, and FC as a function of the demographic data. As substantiated in other investigations, reading level was the most significant variable for all three models.

CHAPTER I
INTRODUCTION

The process of language acquisition is dependent upon many biological and environmental factors. Among the sensory modalities the auditory form is of prime importance for normal acquisition to occur. Deprivation of this modality usually has a disastrous effect on language. Even a cursory comparison of hearing and deaf children reveals the extremely limited verbal expression of the children deprived of auditory stimulation.

In a report to the Committee on the Education of the Deaf, Morton in 1965 stated, in addition to other information, that

> 1. The average graduate of a public residential school for the deaf - the closest we have to generally available "high schools" for the deaf has, in effect, an eighth grade education.
>
> 2. Seniors at Gallaudet College, the nation's only college for the deaf, rank close to the bottom in performance on the Graduate Record Exam. (p. 108)

This situation has remained relatively unchanged 12 years later. Anken and Holmes reported in 1977 that even after years of extensive education with an overwhelming emphasis on language, the linguistic performance of the average prelingually deaf adolescent has remained extremely poor in the areas of reading and written composition.

There have been many hypotheses concerning the poor linguistic performance by the deaf. Numerous investigations have been conducted to support these hypotheses and have provided information about factors

such as etiology, early language stimulation and method of classroom instruction. Additional research has also been conducted to obtain information concerning performance on cognitive tasks, specific linguistic tasks, pertinent qualities of American Sign Language (AMESLAN), as well as the ability of the deaf to precisely communicate information utilizing their own visual-gestural (sign language) system of communication.

The present investigation was conducted to obtain information about two distinct aspects of the communicative ability of deaf adolescents. The Berry-Talbott Test of Morphological and Derivational Rules (BTT) (Berry, 1966) was used to compare linguistic skills for specific morphological items which were presented in two separate conditions--graphic presentation and manual presentation. The graphic and manual BTT scores were then compared.

A measure was obtained of the subject's communicative effectiveness, Functional Communication (FC), for conveying specific information when allowed to utilize his preferred visual-gestural (AMESLAN) communication method. This FC score was compared with both BTT scores. Finally the two BTT scores and the FC scores were compared to the subject's environmental, educational, and medical data.

CHAPTER II
REVIEW OF THE RELATED LITERATURE

Introduction

Because some correlation between the performance of the deaf and the hard-of-hearing has been established, pertinent studies with the latter group are included in the literature review. A review of theories in deaf education is located in the first section. The second section contains theories on the validity of AMESLAN as an effective communication system. An examination of the performance by the deaf on language assessment tasks is the main topic for the third section. Both cognitive and syntactical tasks and their evaluation procedures are included. Specific morphological assessments are found in the fourth section. The rationale and previous usage of the BTT is also reported. Finally a statement of the problem for this investigation is presented.

Theories in Deaf Education

Introduction

Debates as to the exact format of deaf education have prevailed over centuries. On one side there are the educators who take some form of linguistic viewpoint where it is paramount that the child be exposed to, and hopefully learn, traditional English. These educators are advocates of some sort of communication system which preserves traditional English and syntax. Among this group would be found defenders of the

purely oral school, finger spelling and/or signed English approaches. (The latter two methodologies are direct mappings of visual clues upon spoken English.) And among these groups themselves there are disagreements as to the best methodology for implementing language.

In contrast some educators feel that it is more important for the deaf to first acquire any form of communication system. (This would not necessarily preclude learning traditional English at some later age.) The group that considers AMESLAN to be the primary language of the deaf advocates this system of deaf education. The obvious example for their rationale is the markedly superior communicative ability of deaf children of deaf parents, who are exposed to an early form of communication as opposed to the generally inferior communicative abilities of deaf children of hearing parents, who are usually deprived of such a system. However, this visual-gestural system has been traditionally, and in many cases still is, viewed as an inferior communicative system incapable of expressing anything but very simple concrete needs. For this reason it has been only recently that researchers have even considered studying the basic properties and communicative effectiveness of AMESLAN as a language system. Some initial experiments support the traditional view (Schlesinger, 1971) whereas other investigators have found this communication system more sophisticated than previously thought (Bellugi & Fischer, 1972; Bode, 1974).

An overview of traditional and contemporary philosophies and the ensuing controversies in deaf education is included in this section.

Oral vs. Manual Controversy

There is practically total agreement that the education of the deaf has been lacking and that plans should be made to augment it. It would

be rare to find someone who opposed earlier diagnosis of the problem and immediate amplification and extensive language intervention. There is, however, some controversy as to the exact manner for implementation of this training.

The debate of Oralism vs. Manualism is practically as old as deaf education itself. Very generally the oral group believes that instruction should be purely oral and emphasizes amplification, training of residual hearing, and speech reading. The manual group, for the most part, also believes that everything previously cited is important; however, they also emphasize the addition of visual clues to the speech code either by finger spelling, signing or both.

Arguments for Oralism are strong and impressive. Most of the world's population do hear; so it is important that the deaf child be integrated into this society. Signing of any sort is emphatically discouraged since it is believed that it will contaminate and even prevent speech development. Without signs the deaf child is free to develop in an unhindered manner the more "natural" mode of speech. Signing is also discouraged for the additional reason that it is believed to be an inferior language that will only confuse and confine the natural language development of the child because signs are viewed as too inefficient a method to allow for the subtleties of normal language.

These arguments are very attractive to the hearing parents of deaf infants. They offer glowing hope that through constant language stimulation someday their child will overcome his handicap and utilize speech and language like the hearing population. For a very few children this is true.

Manualism has an early history in the United States. The French Method (signs) was brought to this country by Edward Gallaudet and Gallaudet College today conducts instruction using signs. While the Manualists would not deny the child's need to speak and learn traditional English, they believe that some sort of visual clue will enhance this process. They contend that the Oralist's emphasis on speech reading does not give adequate visual information about the language content.

It has been shown by Alterman (1970) that only 20%-40% of English phonemes are visible on the lips. Lip movements are transient and quite fine. They therefore place a great strain on visual proficiency and memory. Pelson and Prather (1974) found that lip reading performance deteriorated somewhat with age for both normals and hearing impaired. The performance of both groups was much better for phrases and sentences than for isolated words. It is often said that the best lip readers are the ones who have the best knowledge of grammar, a good vocabulary, and a good ability to guess at ambiguous content.

Speech may be the natural mode of language acquisition for the hearing child, but if this process is dependent on an intact auditory feedback loop as Fry (1966) believed, then in the absence or deficit of this auditory feedback speech may not be the ideal medium for communication by the deaf.

The Manualists are quick to elucidate that today the deaf population differs from the one of 30 years ago. Now almost all of the children are congenitally or prelingually deaf whereas in the 1940's a little over one-third of the deaf children became so after the acquisition of at least some speech and language. Even a little exposure to language before the onslaught of deafness is of tremendous help in future language learning.

Much of this debate can be related to the heterogeneity of the deaf population itself. The etiology of deafness is extremely varied. Therefore it would not be surprising to discover differences in language abilities with variations in other variables such as IQ, dB loss, educational experience, or anything else.

Now, only about 5% of the population become deaf postlingually as opposed to around 35% in 1940 (Vernon, 1968). Today rubella, when contracted by the mother during any state of pregnancy, is one of the most frequent causes of deafness. The effect of this disease is so insidious that even if the mother should contact such a mild case that she is unaware of any pathology, it is not unlikely that the baby will have a congenital hearing defect.

In a little less than one-half of the cases the etiology of deafness is unknown. It may exist in isolation but is frequently accompanied by other disabilities which may be congenital or acquired. There is less possibility for accompanying anomalies for deaf children with deaf parents since in these cases the disability is attributed largely to hereditary factors.

In a large survey Schein (1975) discovered that 30% or more deaf school children had additional disabilities. It has been noted that four of the five other etiologies commonly associated with deafness are also associated with congenital brain damage. The damage in these cases may be very subtle and masked by the overwhelming variable of deafness. Consequently, with current methods, it is very difficult to detect and delineate brain damage (Vernon, 1968).

With such a heterogenous population as the deaf it could be inferred that a methodology which succeeds with one child may not necessarily be the most advantageous for another child.

Current Theories

At one time the Manualists did not have an adequate reply for the contention that AMESLAN was a poor and inferior language. At best all that could be said was that AMESLAN did afford the deaf some medium of communication. Recent preliminary research has revealed that AMESLAN is really more sophisticated than previously believed (Bellugi & Fischer, 1972; Cutting & Kavanagh, 1975).

It has also been noted that just as spoken language has certain phonemes with specific boundaries, signs also possess equivalent restrictions. Signs are a unique combination of three parameters: (a) place, in relation to body parts, where the sign begins and ends, (b) appearance of the hand that forms the sign itself, and (c) action of the sign (Kannapell, 1974). If any of these parameters are violated then native signers report seeing the sign as either incorrect, dialectical, or the equivalent to "slips of the tongue" (Cutting & Kavanagh, 1975). Indeed it has been observed that the deaf do have their own humor and puns.

There has been much disagreement among the Manualists themselves as to the best method for implementing the visual clues. Hollis and Carrier (1975) cited the work of Premack to support the hypothesis that using a nonspeech mode to implement a set of comprehensive concepts would make it easier to learn the more functional mode of speech.

Kannapell (1974) thought of AMESLAN as the "mother tongue" and suggested that current trends in bilingual education be followed in reference to the deaf. Gallaudet has begun a remedial English program based on foreign language teaching principles (Goldberg & Bordman, 1975).

Conversely, Stokoe (1975) presented some difficulties of incorporating AMESLAN with English inflections as follows:

1. A sign may have only 1 meaning in AMESLAN and several in signed English.

2. Inflections affixed to a sign do not allow for the irregular English formations for certain words.

3. Stress is equal and is taught mainly for adverbs; therefore, the deaf may have no idea that other derivations can occur as in adjectives.(p. 418)

Others view finger spelling as the ideal visual clue for the deaf child. Its proponents argue that since it is an exact letter for letter duplication of spoken English it will give the child an exact knowledge of his language and preserve traditional grammar. Usually finger spelling is used for every word that is spoken. However, it may be used, as in the Soviet Union, for isolated words to help in clarification (Morkovin, 1968).

Hoemann (1974)found that the use of finger spelling did favorably influence the deaf's ability to label pictures. He did caution that it must be introduced at the beginning of formal education. When it is first presented the young child does not recognize a word by spelling out each letter but by the unique hand configurations which compose a particular word. Some of the arguments against lip reading can also be levelled, to some degree at least, against finger spelling. The latter is also fleeting, visually small and somewhat context specific. At the speed of conversation the precise letter configuration is not reached before the movement toward the next letter begins (Fisher & Husa, 1973).

The Oralists' objection that finger spelling hinders the development of traditional speech has not been proven. Most comparisons of orally and manually educated deaf children revealed no differences between the two groups on speech. Lip reading skills were found to correlate more highly with the amount of residual hearing.

Summary of Philosophies in Deaf Education

A review of philosophies in deaf education has indicated the following:

1. Advocates of Oral and Manual education agree on such issues as early diagnosis, immediate amplification, and extensive language intervention.

2. The Oralists emphasize oral instruction, auditory training, and lip reading.

3. The Manualists agree that all activities in the above item are important; however, they also believe that additional visual clues are necessary to aid the deaf's acquisition of language.

4. There has been no evidence that signing or finger spelling hinders the speech of the deaf.

5. There are disagreements among the Manualists themselves as to the best method for language intervention:

(a) finger spelling--which spells each word as it is simultaneously spoken

(b) signed English--which is also a direct mapping to the spoken English except that signs as well as finger spelling are utilized

(c) AMESLAN--which is the unique language of the deaf and does not have the same properties or syntax of spoken traditional English

(d) English as a second language--which, as an instructional philosophy, would borrow from current bilingual programs.

6. A nonsense test of morphology utilizing a manual (signed English) as well as the more traditional graphic mediums for item presentation and response would:

(a) precisely define points of deviancy

(b) give educators of the deaf insight into their present and future instructional format by providing evidence for possible modification.

7. A communicative effectiveness rating (FC) based on the subject's ability to convey some standard prose in his preferred visual-gestural (AMESLAN) medium would:

(a) give insight as to the communicative ability level of the deaf, as well as the effectiveness of AMESLAN itself, to convey thoughts and ideas

(b) contribute more information in the still relatively unknown area of AMESLAN

(c) discern if any correlation on specific linguistic tasks is related to general communicative effectiveness when utilizing AMESLAN.

American Sign Language as an Effective Communication System

Introduction

In this communicative approach with the deaf the concern is not so much with the particular morphemes or syntax of traditional languages (i.e., English, French, Aztec, Japanese, etc.) but rather with the communicative effectiveness of whatever signalling system is being employed. The signalling systems under scrutiny in this study are those traditionally utilized by the deaf such as finger spelling, AMESLAN, lip reading,

gesturing, and signing. It is known that in natural languages, such as English, a plethora of ideas--ideas such as causality ("Getting hit by the bat made John cry.")--and abstract concepts can be adequately communicated. One of the questions most frequently asked about AMESLAN is that of its communicative effectiveness when compared to the efficiency of natural (traditional) languages. Is there a communication deficiency in this particular signing system even when employed by competent signers? Another question under investigation is whether performance on traditional linguistic tasks may give some indication as to the general communicative level of a deaf subject when he is allowed free usage of his own visual-gestural communication system to convey new information.

Acquisition of Communication Systems by Normal and Deaf Children

Around the babbling stage of 4 or 5 months the deaf child's production begins to differ from the normal (Menyuk, 1969). The hearing child, reinforced by hearing his utterances, may amuse himself by constantly repeating nonsense syllables. Naturally the deaf child lacks this reinforcement. Even before this difference in production is noticed there existed an auditory perceptual difference in that the hearing child has been responding to sounds by localization, discrimination and increasing sensitivity to intonation and rhythm. An ever increasing lag develops between the deaf and hearing child. While the hearing child may begin to produce words from 9 to 12 months, this may not occur for the deaf child until age 3 or 4.

There is some evidence for a critical period for normal language acquisition between the ages of 2 to 4 years. It is believed by many that if the opportunity for development is not presented at this optimal

time then the child may never achieve adult competence and performance (Lennenberg, 1966). Unfortunately it is not unusual for language stimulation for deaf children to begin at the time of formal education which is usually around the age of 6 or 7. Hoemann (1974) noted that the scholastic performance of those high school deaf students who had a preschool language program was significantly better than their peers who were deprived of this experience.

Because the deaf population uses gestures instead of speech, it was once thought, and in some cases still believed, to be a primitive system which could only be used for expressing basic needs.

Unfortunately a very primitive gesture system is the only means of communication for some of the deaf. These people are often deaf children of hearing parents and have not been exposed to other deaf people. Even though some signs seem to be universal--as in pointing to the mouth for "hungry" or "food"--this deaf person, for lack of other stimuli, develops his own idiosyncratic gesture system.

Some deaf individuals may develop a more regulated system--due in part to their environment. In schools for the deaf it is well known that the children do in fact sign when the faculty are not watching. Later if they become affiliated with other members of the deaf community their signing becomes more regulated in that certain signs are accepted and used by everyone for a particular word or concept. These people establish a fairly consistent means of gestural communication.

As Bellugi and Fischer (1972) have noted, there are several features all sign languages have in common. These consistencies are undoubtedly due to (a) the mediums employed--hands, space, and body, and (b) the time involved to make message units shorter but still unambiguous.

The above authors found that although it took longer to sign a particular word than to say it, the time it took to say a sentence and to sign it was nearly equal. Research so far has yielded the following adjustments which all signers instinctively utilize: (a) "doing without" or the exclusion of words which do not hinder the intent of a statement such as the copula, articles, inflections, and some prepositions, (b) "incorporation" or a slight variance of a sign which may be utilized to indicate orientation, pronominalization, number, manner, size, and shape, and (c) bodily or facial shifts.

Not surprisingly the above three signing universals are elements that have and still do lead people to believe that signing is a very primitive language.

Deaf children of deaf parents have consistently performed better than deaf children of hearing parents. For the former their sign vocabulary naturally appears a little earlier than words in the hearing child (Stokoe, 1975). This sign vocabulary grows at the same rate as a speech vocabulary.

One of the reasons for this parallel acquisition, at least in the rather early stages thus far investigated, could be the early intervention on the part of the deaf parents with a communication system which the child could employ in much the same manner that the hearing child employs speech. Therefore, the critical language period is not wasted. It has been suggested that perhaps the deaf follow the same stages of acquisition of certain language "universals"--as in the use of negation and overgeneralization--as their hearing peers. Bellugi and Fischer (1972) also reported that the deaf children appear to experience the signing equivalent to infantile baby talk.

Research in the development of AMESLAN in children and the studies of the properties of AMESLAN itself are still very meager and there is a current debate as to the validity of AMESLAN as a language system.

Studies Utilizing Signs for Communication

Schlesinger (1971) performed an experiment in which his deaf subjects were encouraged to sign. Results indicated that even when permitted to utilize their gestural-visual modalities these deaf subjects were unable to communicate to each other the relationship among agent, direct object, and indirect object from among a set of picture cards permitting all possible mutations of these three roles.

Because of these results it has been hypothesized that since the deaf fail on certain tasks of syntactic ability, even in cases where they are permitted to use their own gestural communication, that (a) they lack the means of expressing certain relationships and/or (b) they are totally unaware of these relationships.

The implication of the first hypothesis naturally is that gestural communication is an inferior language because of its inability to express more complex and abstract relationships. Many people oppose signs for this very reason. It is felt that exposure to signs is contaminating in that it binds the signer to the concrete and does not allow the enrichments afforded by traditional language such as abstraction, personification, and humor. There is, however, anecdotal evidence of a certain type of humor typical of the deaf and therefore named "deaf humor," but no standard procedures have investigated this aspect of AMESLAN.

One implication of the second hypothesis is an inability for the cognitive processes of the deaf to proceed beyond a very elementary level.

The syntactic structure under investigation in the previously cited Schlesinger experiment was the direct and indirect object, and the underlying relationship was a rather simple one occurring frequently in daily life.

Bode (1974) replicated this experiment with one important difference. The deaf subjects were matched on environmental and cultural factors. With this variable constant her subjects had little difficulty differentiating their partner's signed message for the appropriate direct and indirect object from among a set of ambiguous pictures. These deaf subjects not only knew about the relationship of this concept but could successfully communicate it to others.

Prose and AMESLAN Communication

Previous investigators have analyzed the deaf's ability to communicate words and specific sentence structures in AMESLAN. No "formalized" analysis has been made of the deaf's ability to utilize AMESLAN to effectively communicate prose. Usage of "formalized" in this instance is the requirement to communicate items of a specific paragraph, and not the mere retelling of a story or event with which the subject is already familiar.

Since we are interested in the communication effectiveness of whatever signalling system is utilized, the Semantic Observational Approach (for rating FC) would be the method to employ. This approach has two main principles: (a) a reality principle--which is concerned with the ideas themselves, and (b) a cooperative principle--which is concerned with the way these ideas are expressed. These principles must also be judged in a thematic structure; that is, the communicator must know

what information the listener needs to know and keep the conversation pertinent to the desired goal or issue of the subject (Clark & Clark, Chapter 2, 1977).

Memory is a vital component for prose recall and consequent communication to others. The performance of normals on certain tasks of memory is briefly reviewed here; and it will be assumed from the data of previous experiments (see section three, Cognitive Research) that the cognitive processes of the deaf for semantic organization are comparable to those of normals.

In a paragraph recall situation, memory (input, storage, output) and linguistic ability are main factors. Because stories and paragraphs are lengthy, very few experiments have been conducted on any subjects. Most of the prose recall by normals is inferred from investigations which can study memory in a more direct manner. These studies would include investigations with words, letters, constituents, and sentences for Short or Long Term Memory.

Clark and Clark (Chapter 4, 1977) cited the following as some of the crucial factors which determine memory for prose:

1. Type of Language--as in a lecture, story, poem, or unrelated sentences of a psychological experiment

2. Input--as in cases of hearing or reading the material and the specific instructions as to what to retain, for example word for word memorization, general meaning of the passage, or notation of particular features as in grammatical errors

3. Retention Interval--as in delayed or immediate recall of the material

4. Output--as in cases where verbatim, or general idea, or judgmements of whether a test sentence was present in the original form. (p. 133)

Certain biases are evident in constructing sentences from memory:

1. input of information not actually in the sentence
2. tendency towards simple (unmarked) syntax
3. strong preference in English for the subject to appear in the initial position
4. preference for the affirmative over the negative
5. with 2 clauses, a preference to describe the events in order of their actual occurrence. (Clark & Clark, Chapter 4, 1977)

The kind and amount of information remembered depends critically on the study strategies people use. This can be seen by the different performances of people who are given the same test but presented with different instructions.

There are other general implications evident in memory recall tasks:

1. to obtain meaning rather than word for word retention
2. a tendency to draw the obvious conclusion
3. a reliance on world knowledge in conformity with the reality principle
4. a tendency to use referents--attempts to integrate new information with what is already known
5. a tendency towards utilizing indirect meaning where the listener tries to build the interpretations he thinks he was meant to build
6. a tendency towards the creation of global representations where with each new sentence people create new representations unrelated to any single sentence. (Clark & Clark, Chapter 4, 1977)

As linguistic ability is one of the two essential features of prose recall, it is very important to remember this paramount feature when choosing a recall passage for any population. Naturally the choice will depend upon the particular research question being posed. For example, since one of the questions of this investigation, the ability of AMESLAN

to effectively communicate new ideas, communication rather than linguistic competence is the major issue. Therefore the prose passage for this study is syntactically relatively simple.

Research conducted by Odom and Blanton (1967) indicated that syntactic order did not facilitate memory recall by hearing impaired students as it did for the hearing. The syntactically ordered stimuli presented in their paired associate paradigm consisted of (a) partial sentences [Verb (V)] phrases or partial [noun (N)] and V phrases and (b) fragments [partial noun phrases (NP) and partial verb phrase (VP)]. Other stimuli were asyntactically ordered.

Further research on the effect of syntactic order on recall performance by the deaf and hearing was conducted by Tomblin (1977). However, he changed his experimental paradigm from that of Odom and Blanton. He studied immediate recall rather than recall from a paired associate task which required a longer retention period. The stimuli consisted of subject-verb-object (S-V-O) strings of 4, 6, and 8 words in length. [Research has shown that both normals (Clark & Clark, Chapter 4, 1977) and especially the deaf (see section three, Linguistic Research) are biased toward this syntactical strategy.] The same words that appeared for the ordered stimuli were recast in an asyntactical manner to form the random ordered group. Although the hearing impaired group did perform less accurately under both conditions when compared with their hearing peers, analysis revealed a decided preference among both groups for the ordered sentences.

Tomblin regarded recall facilitated by syntax for his deaf subjects--as opposed to the opposite findings of Odom and Blanton--as being attributed to the following features: (a) reliance on Short

rather than Long Term Memory and (b) stimuli material which utilized the deaf's predisposition to assign the S-V-O strategy to all phases and sentences.

There have been several investigations of prose recall itself. Walter Kintsch (1977) proposed a hierarchical theory of content representation in texts (or the amount of meaning which might be computed to phrases within a given passage).

He admitted that his theory was too general and too incomplete. No processing models were given. However it does afford the researcher some rather systematized manner in order that the investigation for meaning for texts can become the subject of experimental design.

Usage of a hierarchical memory model is not unique. Collins and Quillian (1969) used it in application to words. For example, the presentation of one word as in "canary" would most readily activate the next higher category (in this case "bird") of which it is a member.

Kintsch's theory is based on the hypothesis that text bases are structured hierarchically by a repetition rule. This rule refers to the idea that given a set of propositions one (or more) is designated, rather arbitrarily at this time by the experimenter, as the topical or thematic element(s). This rule would thereby specify which propositions are connected to other propositions, thus constituting levels of a hierarchy. The thematic proposition is at the top of the hierarchy. For example, in a story about airplane pilots and their many jobs the sentence "Airplane pilots have many important jobs" could be considered thematic. Subordinate to this level would be all properties that share an agreement with the first (thematic) level proposition. To continue with the above example some second (superordinate) level propositions

would be: "transportation between cities," "rescues," and "dropping food." A third (subordinate) level of propositions may be determined by selecting those elements which share agreement with any of the secondary level propositions but not with a first level proposition. [Continuing with the example, the phrases "of people," "of freight," and "of mail" would all three be third (subordinate) level propositions of the second (superordinate) level proposition "transportation."] Kintsch noted that as with the thematic proposition(s) the superordinate propositions are chosen intuitively.

Kintsch was interested in evaluating his theory and chose reading rate and test structure as dependent variables for his experiment since one of the implications of his hierarchical theory was that the number of propositions should have predictable psychological effects. His experiments with the number and type of propositions as well as syntactical complexity was related to reading time and the number and type of propositions recalled. A summary of the results from his experiments tend to give validity to his theory.

1. Reading time can be expressed as a linear function of the number of propositions processed during reading and the length of the text.

2. Time per proposition is variable (.5 sec. for short historical narratives - 4 sec. for the longest psychological definition). The longest paragraph has only been 60 words.

3. The manner which the subjects process a test is related to the structural relationship among the propositions. Many-different-arguments require longer reading time than few-different-arguments; however the number of propositions recalled for both text types is the same.

4. Superordinates are defined the best; and as the level of propositions descends so does recall.

5. Superordinates were better recalled regardless of their surface structure or serial position.

6. A primacy effect was observed for the superordinates.

7. No primacy effect was shown for the subordinates.

8. No recency effect was noted for both the superordinates and the subordinates. (Kintsch, Chapter 4, 1977)

No investigations similar to the ones above have been conducted with the deaf for either communicative or cognitive information.

Summary of American Sign Language as an Effective Communication System

A review of American Sign Language as an effective communicative system has revealed the following:

1. At one time signs were only viewed as a very primitive method to make known basic wants and needs.

2. Recent research has indicated that sign language does have certain consistent features which would imply that it is a more sophisticated communication method than previously thought. Naturally more research as to the exact properties involved is needed.

3. Deaf children of deaf parents have an advantage over their peers of hearing parents in that the former are given a communication system at once during the very early years which some authors believe critical for more sophisticated language acquisition.

4. Deaf children of deaf parents display similar stages of infantile communication in signs as hearing children do for speech acquisition. More exacting research is needed in this area.

5. It has been shown that deaf children of deaf parents have an advantage in traditional language learning than deaf children of hearing parents. More research is needed to determine if this traditional language advantage persists for older deaf adolescents for more complex syntactical tasks.

6. There is a great controversy as to the validity of AMESLAN as a communication system and its ability to adequately communicate abstract thoughts, concepts, or basic relationships. Again, more research is needed.

7. Because of the specific properties of AMESLAN, the ability of the deaf to communicate concepts and ideas in their visual-gestural mode has been questioned; therefore, a rating of the deaf's ability to communicate in their preferred medium (AMESLAN) some standard paragraph information would:

(a) give additional information to this debated question

(b) help ascertain if performance on specific linguistic items is a reflection of general communicative abilities

(c) contribute information into the relatively unknown area of the deaf's cognitive processing for memory for prose when test design and recall ratings similar to Kintsch's theory are utilized and results compared with his preliminary experimental findings for hearing subjects.

Language Assessment

Introduction

In this section the communicative ability of the deaf is viewed in the more traditional linguistic methods of English. The question

here is not one of communicative effectiveness, but rather the ability and extent to which the deaf are able to utilize and/or understand the syntax of a natural language. To what extent and in what ways does the syntax of the deaf differ from that of a hearing child acquiring English? Educators of the deaf who have continually attempted, albeit for the most part unsuccessfully, to teach English from infancy through young adulthood are particularly interested in the specific results of syntactic studies. It would be invaluable to know if one testing procedure, as opposed to another, would be more indicative of the deaf's true linguistic ability. It would be equally enlightening to discover if specific linguistic skills were related in anyway to the overall communicative effectiveness in situations where AMESLAN is used. Language was first assessed indirectly through cognitive tasks. Later studies of specific syntactic structures were begun. Both cognitive and specific syntactic research are presented in this section.

Cognitive Research

People have traditionally assumed that speech, language, and thought were associated with each other. Speech and language have always been considered as primary factors for placing humans in a rather special category apart from other animals. Speech is acquired by practically everyone and proceeds along fairly consistent stages with little geographical or cultural variation. Speech was considered the outward manifestation of the presence of language. Language in turn was viewed as necessary for performing the mediating processes necessary for thought.

Speech and language acquisition are so unique that it caused the Ancients to view it as a direct gift from the gods. Therefore any event

which might disrupt acquisition or interfere with language already acquired was interpreted as an act of the gods. Hence, any intervention for the specific purpose of teaching language was not even considered.

As time passed speech and language were no longer thought of as gifts from the gods. However, the belief remained that the absence of any outward manifestation of language, that is, speech, preempted any ability to think or reason. An archaic Spanish rule specified that deaf children who did not speak were not entitled to inherit the lands of their parents. (Naturally these parents invested a great deal of time and effort so that their deaf child could utter a few words and thus circumvent the law.)

Remnants of the association of speech, language, and thought remain today as in the usage of such expressions as "deaf and dumb." Speech pathologists report that questions often arise as to the extent of the cognitive ability of a speechless individual.

Cutting and Kavanagh (1975) presented a good framework for viewing speech and language which were seen as "a model of separate entities in a symbiotic partnership performing similar functions towards similar ends but at different levels" (p. 503). Caution was offered about the danger of forgetting the interrelated functions of these two systems. However, according to their theory speech works upward in the communication chain to constrain and alter language while language descends in the opposite direction to alter speech, the vocal tract, and perhaps the ear.

Several intuitive and logical arguments were proposed for this separation: (a) comparison of the rules of phonology with those of syntax and semantics, (b) comparison of the development of speech in

man and in the child, and (c) comparison of sign language to speech. It was concluded that it was possible to have speech without language (as in fluent aphasics and babbling infants) and language without speech (as in oral apraxia).

However, there were several different opinions as to possible entries for the category of language without speech. Would it be acceptable to place the chimpanzees who use signs or symbols in this category? As for the deaf, Furth's book, Thinking Without Language (1966), was evidence for the position whereas Bellugi and Klima's book, The Signs of Language (in press) was evidence for another position.

However, the absence of speech does not necessarily presuppose the absence of language and/or thought. Because of the heterogeneity of the deaf, language assessment has always been difficult. Therefore one popular method has been to relate language to cognition and concept formation and then evaluate performance on language free tasks.

Perhaps the most prolific writer in this field has been Hans Furth. He summarized his results (1966) for the performance of deaf children on certain Piagetian tasks and concluded that their performance was essentially the same as that of hearing children. Thus, at least for the ages and concepts evaluated, the linguistically incompetent deaf performed cognitive tasks on a par with their hearing peers.

His results are not without contradiction, but Furth attributes the poorer performance by the deaf in these studies to the influence of environmental factors and/or test design. In fact, the detrimental effects of institutionalization on the deaf's performance for some of these tasks have been reported (Raviv, Sharan, & Strauss, 1973).

In a review of all studies conducted with deaf and hearing children, Furth (1971) attempted to isolate the effects of linguistic deficiency. Areas were grouped according to (a) rule learning, (b) logical symbols, (c) Piagetian tasks, (d) memory, and (e) perception. He concluded that a single specific cognitive area cannot be designated where the deaf perform poorer than the hearing controls. Some areas where the younger deaf were initially poorer were located but they improved with maturation and finally equalled the performance with their hearing peers.

The specific tasks must be considered when interpreting the above data. Sinclair-De-Zwart (1969) did find syntactic ability correlated with the Piagetian conservation task. This result was in opposition to that of Furth whose task was more elementary. Goodnow (1969) cautioned that "type of thought" and "strength or stability of thought" should be considered in that it is important to test familiar, significant material to determine what the child can do, but it is equally important to discover if the response is merely a replication of past experience rather than an extension of experience.

Few studies have tried to assess semantic organization through language. Tweney and Hoemann (1973) chose to ascertain the development of semantic associations in profoundly deaf children with regard to the syntagmatic-paradigmatic shift. Noun, verb, and adjective associations were presented by signs to the deaf. This very age related shift has been found to occur in hearing children between the ages of 5 and 7. Results indicated that a consistent and regular shift to paradigmatic responses could be observed in the deaf but these responses were less advanced than those for the hearing controls. The authors suggested that for the deaf these deficits were quantitative rather than qualitative.

Tweney, Hoemann, and Andrews (1975) also studied semantic organization through the clustering of nouns by deaf and hearing subjects. When the stimuli were equally familiar to both groups no differences in clusterings were found.

It appears, then, that for the relatively elementary types of cognitive tasks thus far investigated the performance of deaf children is similar, although at times less advanced, when compared to that of their hearing peers.

Linguistic Research

Recently researchers have investigated the performance of the deaf on specific syntactical items. These investigations, which focused on structures, revealed more descriptive and quantitative information about the actual linguistic performance of the deaf subject than the language-free cognitive tasks.

Pertinent studies of the hard-of-hearing are included in this section since their performance reflects many of the same difficulties of the deaf. Depending upon the specific task, an analysis of the language of normal, hard-of-hearing and deaf children usually reveals an approximation by the hard-of-hearing group to that of the normals and a very limited and retarded performance by the deaf. However, with certain more sophisticated syntactic structures, the hard-of-hearing perform very similarly to the deaf. Sometimes this difficulty is only revealed through tests explicitly designed to assess performance on a particular construction. It is not because these deficient areas are unimportant that they remain unnoticed, but rather the hard-of-hearing child may succeed and function adequately in spite of them. In contrast the

deficiencies of the child are quite apparent. On many tasks his performance is limited, absent, or indicative of immature and/or deviant strategies.

Brannon (1968) compared the spoken output of normal, hard-of-hearing, and deaf children according to a linguistic word class system devised by Jones, Goodman, and Wepman (1963). Fifty spoken responses to pictures were recorded from each with the hearing impaired having an additional response form so that they could write each response as they said it. These responses were then classified into 14 distinct grammatical classes. The differences in basic vocabulary were great with the normals having a vocabulary of 10,876 words and the hard-of-hearing and deaf having vocabularies of 4,440 and 3,256 words respectively.

An analysis according to word category revealed that the hard-of-hearing, although definitely limited, were not significantly different from the normals. There was a tendency for the hard-of-hearing to be deficient in adverbs, pronouns, and auxiliaries. In comparison the deaf were deficient in these categories as well as in all of the remaining ones. Overusage of nouns and articles was noted for both hearing impaired groups.

These results were consistent with those of a previous study (Brannon & Murry, 1966) which utilized the same testing procedures but analyzed the sentences according to categories suggested by Myklebust (1964). Sentences were then scored as to (a) additions, (b) omissions, (c) word substitutions, and (d) word order. This procedure revealed the tendency of the hard-of-hearing and especially the deaf to utilize simple S-V-O sentence order.

In order to determine a hierarchy for graphic, phonetic, and associative characteristics in response selection Blanton, Nunnally, and Odom (1967) compared the performance of deaf and hearing students on three types of word association tasks which consisted of associative, rhyming, and graphemic similarities.

Both groups had the same order of preference: associated, graphemically similar, and rhyming pairs. These results led the authors to hypothesize that the hearing and deaf subjects were using the same processes. The deaf did indicate a greater tendency to associate words on the basis of their graphemic similarity, but this did not hinder their ability to respond on the basis of other relationships.

Although hearing, hard-of-hearing, and deaf children may use the same strategies on paired word association tasks, the actual spoken and written vocabulary of the three groups was clearly distinguishable no matter what categorization or scoring method was employed. The hard-of-hearing performance shadowed that of normals but showed deficiencies in the usage of adverbs, pronouns, auxilaries, and a tendency to overuse simple S-V-O order in sentences. These same characteristics, but in a far more pronounced degree, were also observed for the deaf.

Rather than investigating mere word count and/or category differences, other researchers have examined the usage of specific constructions in the sentence unit considered as a whole.

Wilcox and Tobin (1974) investigated the linguistic performance of hard-of-hearing and hearing children on certain verb constructions. Preliminary investigations had revealed that the subjects, who were approximately 11 years old, had already mastered the simpler constructions of negation, question formation, and past tense. The following verb

constructions were considered: present tense, the auxiliaries (be+ing, have+en, will), passive, and negative passive.

There were two sets each of which contained six sentences which were constructed and used under the following three experimental conditions: (a) repetition with visual stimuli, (b) recall where the picture was shown and the appropriate sentence was required, and (c) repetition without visual stimuli. Both groups had more difficulty with the recall task. The performance of the hearing impaired group shadowed that of the normals on all constructions with the exception of the auxiliary have+en and the negative passive.

The authors interpreted the results as indicating that the hard-of-hearing performance differed in degree rather than kind. They cited the findings of Menyuk (1969) for hearing children from 3 to 7 years of age. The percentage correct for these children was practically the same as that achieved by Wilcox and Tobin's older but hard-of-hearing children.

Correct Usage	Menyuk	Wilcox & Tobin
be+ing	100%	100%
passive	64%	73%
have+en	25%	45%

(p. 292)

Quigley and Power (1973) gave three types of passive sentences to a group of deaf children ranging in age from 9 to 18 years. Reversable, non-reversable, and agent deleted reversable passives were evaluated. The subjects were required to move toys representing the subject and object of the sentence. For the production task an incomplete sentence naming the subject and object was presented under a picture. The subjects were asked what happened, and they responded using one or more of

a set of provided words. Some of the words employed were: was, Verb-ed, by, Verb-ing, and did.

Differences in performance and comprehension were seen as a function of age. A hierarchy of difficulty appeared which from least to most difficult was: nonreversable passives, reversable passives, and agent deleted passives. Practically all of the hearing had mastered the comprehension and production of the passive by age 8 whereas this was not the case for the deaf even at the ages of 17 or 18. None of the older deaf adolescents met the 75% (items correct) passing criterion for each structure. The average correct scores for the older deaf adolescents were: 65% for nonreversable passives, 60% for reversable passives, and 35% for agent deleted passives.

It seemed apparent that the deaf often only used "by" of the agent as a marker for the passive. This strategy coupled with the deaf's overuse of S-V-O word order for sentence comprehension could cause them a great deal of confusion especially in reading. Hearing 3 year olds have interpreted passives in this manner.

For correct interpretation of indirect and direct objects younger children rely solely on the marker "to" as in "He gave the flowers to the girl." Older children however can differentiate direct and indirect objects by other strategies. Sentence ambiguity may also be clarified by: (a) insertion of an article ("They fed her dog the candies" or "They fed her the dog candies") and (b) appropriate disjuncture as in a pause or stress.

Scholes, Tanis, and Anderson (1976) presented a picture verification task in order to ascertain the comprehension by hard-of-hearing children for direct and indirect objects in sentences. These students

were attending classes in regular public schools and ranged in age from 9.5 - 19.4 years. Subjects were shown a series of slides with each slide containing four pictures. These pictures included: (a) a "B Reading" where the article was inserted before the last two nominal elements as in "They . . . the dog candies" thus rendering the entire unit as the indirect object; (b) an "A Reading" with the insertion of the article before the last nominal as in "They . . . the candies" thus rendering a single word as the indirect object; and (c) two other randomly selected pictures from other test sentences which bore no resemblance to the lexical items mentioned in the sentence to be evaluated.

Subjects were presented 10 unambiguous and 5 ambiguous sentences. "They fed her dog candies" is an example of one of the ambiguous sentences. The test sentences were presented both orally and graphically as well as a simultaneous presentation of the slide pictures. The subject pointed to the picture number which corresponded to the sentence.

Lexical errors, the selection of unrelated pictures to sentences, were practically nonexistent. However, the average 14.5 year old hard-of-hearing student correctly comprehended only 59% of the unambiguous sentences. These results were comparable to the comprehension of a hearing 5 year old. By the age of 13 hearing children correctly comprehended 91% of these unambiguous sentences.

The authors noted that for the ambiguous sentences there was a preference for the B Readings by both the hearing and hard-of-hearing groups. This preference increased with age but was not present in college subjects. This discovery was interpreted to represent a changing bias toward one or more developing comprehensional strategies. For the most part this bias would be non-linguistic in that it would favor the more probable or "most likely" meaning of a sentence.

Scholes, Cohen, and Brumfield (in press) administered a similar task to 234 deaf students in grades 8 - 12 in a residential school for the deaf. The similarity of the deaf's performance to that of the public school, hard-of-hearing students is quite remarkable. The deaf comprehended 60% of the unambiguous sentences. For the ambiguous sentences there was again a preference for the B Reading form. This might suggest that the deaf, hard-of-hearing, and hearing shared a comprehensional strategy bias.

Quigley and Power (1972) began the development of a Test of Syntactic Abilities (TSA) as part of a total research program to evaluate comprehension and production for the following areas: (a) determiners, (b) negation, (c) question formation, (d) pronominalization, (e) reflexivization, (f) the verb system, (g) conjunction, (h) complementation, and (i) relativization. Subtests for nominalization and several aspects of complementation were omitted from the final version of the TSA because the authors reported little understanding of their usage by 18 and 19 year old deaf students even after extensive pretesting. For each structure under investigation the subtests of the TSA contained written items where the subject was required to make judgments as to the correct meaning of the stimulus sentences and/or determine the grammaticalness of the stimulus sentence and correct it when necessary. The following are two examples:

The girl who hit the boy went home.

What happened?

The girl hit the boy. yes _____ no _____

The boy hit the girl. yes _____ no _____

The boy went home. yes _____ no _____

The girl went home. yes _____ no _____

(Quigley, Smith, & Wilbur, 1974, p. 328)

1. The girl who the girl found the ball played in the park.

   Check ONE box. The sentence is:

   Right _____ Go to 2.

   Wrong _____ Change the sentence to make it RIGHT.

   Write the right sentence here _____

(Quigley, Smith, & Wilbur, 1974, p. 329)

Utilizing a subtest of the TSA Quigley, Wilbur, and Montanelli (1974) investigated question formation by the deaf. Results indicated increasing improvement for the deaf with age. However even the youngest hearing subject in the third grade consistently obtained higher scores than the majority of the older deaf subjects. A response hierarchy did appear for both groups with the best comprehension for yes/no questions followed by Wh- questions. Tag questions proved to be the most difficult.

Quigley, Smith, and Wilbur (1974) again employed subtests of the TSA to study relativized sentences in the deaf. The clauses were classified according to: (a) placement [final (F) or medial (M)] and (b) function of the relative pronoun (subject or object, with or without a pronoun).

Results of the processing test again demonstrated a marked superiority by the 10 year old hearing subjects (83% correct) when compared with the 18 year old deaf subjects (76% correct). For both groups a hierarchy of difficulty existed with the easiest pronoun for both groups dependent on its position in the embedded clause. Beginning with the most difficult the following order was observed: (a) object-pronoun clause, M position, (b) subject-pronoun clause, M position, (c) subject-pronoun clause, F position, and (d) object-pronoun clause, F position.

The deaf showed more improvement with age for the final position with 91% correct at age 19 as compared with only 45% correct at age 10. However, increased performance with age was not witnessed for the medial position which revealed 56% correct at age 19. This latter score is similar to the 10 year old hearing subjects' responses of 68% correct for the medial position.

When presented with embedded sentences the deaf frequently inappropriately deleted the noun phrase in the following manner: "The dog chased the girl had on a red dress." The deaf showed particular difficulty with the possessive. Older groups did accept the proper form of possession "whose" in a relative clause, and they also recognized as incorrect sentences where the possessive was required but was not present. However, they were also unable to recognize as incorrect sentences with the possessive form noun phrase where "whose" was required, such as, "I helped the boy's mother was sick."

A study by Davis and Blasdell (1975) revealed that the hard-of-hearing also had difficulty with relative clauses. The purpose of the investigation was to ascertain certain perceptual strategies of hearing and hard-of-hearing children aged 6 - 9 years. Sentence stimuli of the following form were read to the children:

The man	who	chased	the sheep	cut	the grass.
N1		V1	N2	V2	N3

The children pointed to the appropriate picture from among a choice of four which were designed by the experimenters for the following four possible perceptual strategies:

1. N1 V2 N3 (The man cut the grass). This involved comprehension of at least 1 and probably both sentences underlying the main sentence.

2. N1 V1 N2 (The man chased the sheep). This involved comprehension of only 1 underlying strategy--S-V-O.

3. N2 V2 N3 (The sheep ate the grass). This response indicated a failure to comprehend either of the 2 underlying sentences.

4. N2 V1 N1 (The sheep chased the man). This response reflected a failure to comprehend either of the 2 base sentences and could have resulted from the use of 0 - 2 lexical items as a basis for comprehension. (p. 285)

Results indicated a quantative and qualitative difference in the scores of the two groups. Although both groups placed more emphasis on making the first noun the subject, this was more often true for the hearing group (92%) than for the hard-of-hearing group (74%). Among the latter group there was also a marked tendency to use the confused strategy (N2 V2 N3) of taking the object of the relative clause and making it the subject and using the verb and noun immediately following it as the main verb and object. This type of response persisted in spite of the fact that it necessitated the acceptance of a verb that did not appear in the stimulus sentence.

This acceptance of a totally new verb is important in that it indicated an overwhelming tendency of the hearing impaired toward this type of strategy. In the Quigley, Smith, and Wilbur (1974) experiment the required responses were yes/no to several written sentences to determine the correct perception of the stimulus sentence. The deaf might easily interpret in his sentences the N2 of the embedded clause as the "logical" subject of V2. The following sentence provides an example from one of Quigley's stimulus sentences and a possible interpretation of the deaf.

The girl	who	hit	the boy	went	home.
N1		V1	N2	V2	N3

However, the overwhelming preference for an N2 V2 N3 strategy is not as obvious in the above example because, unlike the Davis and Blasdell study, there is no need to accept a new verb. "The boy went home" is more likely to occur than "The sheep cut the grass."

Wilbur, Quigley, and Montanelli (1975) administered appropriate subtests of the TSA to investigate the deaf's performance on conjoined sentences. Results indicated that production of conjoined sentences was more difficult than judgments of grammaticalness. For the deaf subjects conjoined subjects were easiest followed by conjoined objects and conjoined verb phrases. The general pattern of development again seemed to shadow that of the hearing subjects. However some syntactic deviations were found to be peculiar to the deaf and resistant to improvement with age. It appeared that the deaf had not mastered a rule of conjunction in which the subjects of the two sentences must serve the same function. In the following two sentences, "The boy kicked the cat" and "The cat ran away," it seemed to many of the deaf that it was the boy who ran away.

To ascertain the deaf's performance on verb inflections and auxiliaries Quigley, Montanelli, and Wilbur (1976) compared the performance of deaf students of ages 10 - 19 years with that of hearing students with an age range of 8 - 10 years on the following aspects of the verb system: auxiliary verbs, tense sequencing, verb deletion, and the confusion of "be" and "have." The appropriate subtests of TSA were employed.

Results revealed the extreme difficulty that deaf students had with verb agreement and the extreme age differences for correct performance by the hearing and deaf. Although some improvement was seen with age, even the oldest deaf subjects performed at a significantly lower level

than the 10 year old hearing subjects. A hierarchy of difficulty for tense could be observed which from least to most difficult was: simple past, future, present progressive, perfective, and passive. These results concurred with those which Wilcox and Tobin (1974) found for their younger hard-of-hearing students.

Judgments of grammaticalness did improve for the deaf, but this was discovered to be caused by an increased awareness by the older deaf subjects to judge incorrect sentences as ungrammatical rather than an increased ability to recognize a correct sentence as being grammatical. Even if the deaf did recognize a sentence as being incorrect, as in verb deletion, they were quite often unable to supply a verb that was correct in either number or tense. This difficulty was similar to the results in the Wilcox and Tobin (1974) study where there was a marked tendency to confuse "have" and "be."

Summary of the Review of Language Assessment

A review of language assessment has indicated the following:

1. Language and cognition may be unrelated to the extent that young deaf and hearing children usually displayed similar performances on elementary Piagetian tasks, and both groups had no difficulty with the semantical organization of nouns, verbs, and adjectives if the word stimuli were familiar to them.

However, there was a question as to the relationship of language and cognition with an increase in age. Sinclair-De-Zwart found the more difficult Piagetian tasks related to syntactic ability. More research utilizing more difficult tasks with older populations is indicated.

2. There was a tendency for hearing, hard-of-hearing, and deaf to prefer the same problem solving strategies.

(a) On a paired word test, all three groups preferred association, followed by graphemically similar, and rhyming pairs.

(b) For a sentence repetition task under three experimental conditions the hard-of-hearing and hearing had the most difficulty with the recall task.

(c) A tendency with age for an increased interpretation of B Readings (Art + N + N) for ambiguous direct and indirect object sentences was observed among the hearing, hard-of-hearing, and deaf.

3. Although even the oldest deaf subjects often scored lower than the youngest hearing subjects, the deaf appeared to follow the same pattern of acquisition as the hearing in that the deaf did acquire, although in many cases after a delay of several years, some of the earliest appearing syntactical forms:

(a) present and past tense

(b) pluralization

(c) yes/no questions

(d) relativized clauses in the final position.

4. Other data indicated that for some structures the deaf showed more than a gross delay but rather a chance performance which indicated no valid knowledge of the particular structure under scrutiny.

(a) Passives were usually acquired by hearing children by ages 8 or 9 whereas the older deaf were still processing all sentences as S-V-O. Usage of the marker "by" was their only indication of the passive. This strategy was observed to be similar to that of a 3 year

old hearing child. Even by age 18, the deaf student performed correctly on 65% for non-reversable passives, 60% for reversable passives, and 35% for agent deleted passives.

(b) Indirect and direct object distinctions were initially correctly comprehended through the use of the marker "to" by hearing, hard-of-hearing, and deaf children. By the age of 13 the hearing children had acquired additional strategies and could make the object distinctions with 91% accuracy. However, hard-of-hearing subjects of 14.5 years of age comprehended these distinctions with only 59% accuracy. Deaf children of 16.5 years were able to comprehend only 60% of these structures.

(c) Sentence comprehension for certain question formations by 18 year old deaf subjects revealed a correct performance of 70% for Wh- questions and 60% for tag questions.

(d) For medial embedded relativized clauses the 19 year old deaf scored 56% correct which is comparable to 68% correct for a hearing student at age 10.

5. Deviant strategies were observed in the performances of the hard-of-hearing and deaf in their

(a) confusion of the verb "be" and "have"

(b) inability to recognize the need for the possessive noun phrase "whose"

(c) tendency to take the object of the embedded relative clause, make it the subject, and use the immediately following verb and noun as the main verb and object

(d) ignorance of the conjunction rule that the subjects of the sentences to be conjoined must serve the same function.

6. Previous syntactic studies were conducted in either the graphic or oral medium which required either graphic, oral, or pointing response. There is a possibility that poor performance resulted more from the deaf subject's difficulty in expressing himself in the required test format rather than his lack of English syntax. Tweney et al. (1975) found no differences in semantic categorization between deaf and hearing subjects when the stimuli were signed to the deaf.

If the same test were given under two separate conditions--one utilizing traditional graphic stimuli and responses and the other condition employing a format more indigenous for the deaf (signing and finger spelling) for stimuli presentation and subject responses, scores would:

(a) answer questions as to the true linguistic ability of the deaf for these items

(b) serve as a possible design for future linguistic investigations with this population.

7. The studies indicated that knowledge of syntactical structures in the deaf could be classified as to delay in acquisition, usage of inappropriate or deviant strategies, and complete absence of certain structures.

Further research with different age groups on language structures is needed to help ascertain:

(a) which of any or all of the above conditions is applicable to specific structures

(b) background information so that some educational process of remediation could then be commenced not only for the deaf but for the hard-of-hearing as well.

Morphological Assessment

Introduction

The communicative ability of the deaf is examined again according to the linguistic approach, but morphology, rather than syntax, is the theme of this section. The same questions posed in the introduction for section three are also relevant for this section. Exactly when and how does usage of morphological rules employed by the hearing child occur in the deaf? Can morphological performance by the deaf be enhanced through a presentation and response format more indigenous to the deaf as in finger spelling and/or signing? Can performance on these specific morphological structures predict general communication effectiveness in situations where AMESLAN is used? This section includes the rationale for the Berko Test of Morphology (BTM) and its usage with various populations including the deaf.

Rationale for the Use of Nonsense Syllables

In 1958 Jean Berko developed a classic study to assess children's knowledge of English morphology. In order to insure correct internalization of the English rule for certain inflections she used nonsense stimuli rather than real words. This technique would eliminate the possibility of the child responding with the correct inflection because of previous experience with a particular word. For example, if he knew that the plural of witch was witches he may have simply memorized that form. However, if he correctly responded with the nonsense word "gutches" as the plural of "glutch," it was assumed that this particular rule for pluralization had become internalized.

Lists of the most commonly used vocabulary of first grade children's conversations, compositions, and letters were studied. These lists included all of the English inflectional morphemes. From this information the author decided what kinds of extensions might be expected to be made by the young child. The areas assessed were plurals, past tense, third person singular of the verb, progressives, comparative and superlative of the adjective, and two possessives of the noun. Derivational and compound words were also included.

When written the terminal letter "s" may express several different structures (plural, third person singular, or possessive). The spoken allomorphs of the letter "s" (/-s/, /-z, /-əz/), even though syntactically may express different structures, are phonologically conditioned and identical with one another. Similarly graphic inflection of the regular past tense is "ed"; however, the productive allomorphs (/t/, /-d/, /-əd/) are also phonologically conditioned. An example for the past tense would be:

/-t/	after stems that terminate in voiceless sounds as in /p/, /k/, /tʃ/, /f/, /θ/, /s/.
/-d/	after stems that terminate in voiced sounds as in /b/, /g/, /v/, /ð/, /m/, /n/, /ŋ/, /r/, /l/
/-əd/	after stems that terminate in /t/, /d/

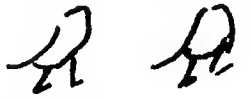
The progressive "-ing" and the adjectives "-er" and "-est" are invariable. It should also be noted that the plural possessive has an /-Ø/ allomorph. There is no phonological difference in singular and plural possession. This difference is indicated graphically, however, by placement of the apostrophe as in "boy's" and "boys.'"

Also noted in the first graders' vocabulary and consequently tested by Berko were words consisting of a free morpheme and a derivational suffix as in "teacher" or of two free morphemes as in "blackboard." She felt that there were enough examples to warrant testing the diminutive-affectionate-y, the adjectival-y, and the agentive-er.

To assess the child's use of various morphological rules under differing phonological conditions nonsense words were made up which followed phonological rule usage in English. Several real English words were also included in the test.

Each test plate included nonsense pictures and a text which omitted the desired form. Figure 1 illustrates an example of a test for the plural allomorph /-z/. A plate similar to the following would be used:

This is a wug.



Now there is another one.
There are two of them.
There are two _____.

The test was also given to native adult speakers of English. Their responses, which did vary, were the criterion used in evaluating the children's responses for the derivational and compound words.

The test was given to preschool and first grade children. Consistency, regularity, and simplicity were three main characteristics of the children's responses. New items were not treated in an idiosyncratic pattern. Best performances were on those forms that are the most frequently used and/or have the fewest variants.

The importance of Berko's work in linguistic investigation is evident by the fact that other researchers have adapted and/or modified the basic test and used this instrument in morphological studies with different populations. The basic validity of nonsense words as measurements of morphological sophistication has been validated by many studies.

Anisfeld and Tucker (1967) studied the productive and receptive performance on pluralization rules by 6 year old American children. A general hierarchy of difficulty emerged with the easiest allophone being /-z/ followed by /-s/ and finally /-əz/.

Ivimey (1975) used the Berko method to study the formulation and use of morphological rules in a large sample of London school children between the ages of 3.5 to 9 years. His results were also in broad agreement with those of Berko; the acquisition process, however, for his population was much slower.

The Grammatic Closure subtest of the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, McCarthy, & Kirk, 1968) was modeled directly after Berko's test but used meaningful lexical items to assess a child's productive competence for morphological rules. This particular subtest of the ITPA is regarded by many speech clinicians as one of the few subtests that actually measures what all of the subtests claim to appraise--mainly the evaluation of language. There is an excellent correlation between Berko's test and the Grammatic Closure subtest.

Pettit and Gillespie (1975) compared the performances of children from 3 - 8 years of age on 10 selected items from the Berko test and 10 corresponding lexical items from the Grammatic Closure subtest of the ITPA. Results concurred with those of other researchers in that the children scored higher on the meaningful ITPA items than on the Berko items at every age level.

Berry and Talbott (Berry, 1966) published a language test adapted from Berko which utilized nonsense pictures and words in a sentence completion task. Thirty-eight items were used to explore the child's ability to make up and to use rules of grammar and syntax. All of the morphological inflections which were assessed in the Berko test were also incorporated in the Berry-Talbott Test (BTT). The authors stated that their test was limited to the knowledge of linguistic morphology common to children between 5 - 8 years of age.

The plates are presented to the child so that he may see the pictures, and if he is able, to follow the sentences that are read to him. No attempt was made to secure normative scores for various age levels. Based on preliminary studies the authors predicted differences in performance levels with age so that:

> In general . . . the average 5-year old child would successfully complete the sentences on Plates I - V, the 6-year old, I - XIV (with one error); the 7-year old I - XX (with one error); and allowing for one error the average child of eight years should be able to sweep the series I - XXX. (p. 3)

Vogel (1977) found both the BTT and the Grammatic Closure subtest of the ITPA extremely valuable measures for identifying children who were good readers from those who were dyslexic. Both tests were administered and results indicated that the dyslexics were significantly inferior to the good readers. The author hypothesized that difficulty with even simple morphological inflections could result in inefficient use of the semantic and syntactic clues provided by morphology in written material.

Newfield and Schlanger (1968) utilized Berko's nonsense words as well as a list of real words to compare acquisition of English morphology by normal and educable mentally retarded children.

The learning pace was slower for the latter population; however, the order of acquisition was the same as for the normal group. Differences favoring correct responses for real over nonsense items appreared for both groups. The disparity was greater for the mentally retarded group. This result helped confirm Berko's supposition that there is a difference in application of a rule to a familiar item and the generalized application of this rule to unfamiliar items. It appeared that application of inflectional endings appeared first in familiar contexts and then, after some time lapse, this rule could be extended to unfamiliar items.

Dever and Gardner (1970) also studied the performance of normal and retarded boys on Berko's tests. Their results supported those of Newfield and Schlanger (1968).

In the above study it was observed that although some of the children failed to supply the correct morpheme in the test situation, they did in fact use it correctly in conversational speech. In 1972 Dever presented a revised Berko test and also two samples of free speech from 30 educable mentally retarded boys.

Results revealed that although lexical items were slightly better predictors than nonsense items, both stimuli were poor indicators of correct morphological usage in spontaneous speech for this population.

No differences in morphological structures in the language of disadvantaged and advantaged children were found when Shriner and Miner (1968) assessed the groups' receptive and expressive performance on a Berko type nonsense syllable test. The test did measure linguistic ability as both groups improved in application of morphological rules to unfamiliar situations with a corresponding increase in mental age.

The authors hypothesized that when relevant variables such as IQ and articulation are controlled the morphological abilities measured in their study may not be sensitive enough to any discrepancies between the two groups.

The Berko Test has not been without criticism. Some critics claim that the use of nonsense syllables is a confusion factor and that actual language is better than test results would indicate. One of the harshest criticisms is the myth of an "ideal" or "standard adult model." The responses of Berko's adults did vary for the derivational and compound words; however, other authors have found the adult responses for these items much more variable than those obtained by Berko. Dever and Gardner (1970) criticized their version of Berko's test on this point. They accepted and scored as correct for the students any of their teachers' responses for those items that occurred with a frequency of over 15%. Ivimey (1975) also found his adult models far from stable. He attributed this factor to the increase in linguistic sophistication (as measured by postschool education) so that greater deviance was demonstrated in manipulating the nonsense words.

Larson, Summers, and Jacquot (1976) specifically criticized the BTT on the ambiguity of adult responses. None of his adult models achieved a perfect score on this test, and the majority missed between six and seven items. The following four items were missed by more than half of the adults: the diminutive of "nad," the derived word "nadhouse," and the two derived adjectives "troppy" and "liggy." Not surprisingly these were also the same items most often missed by the children whose ages were 5.5, 6, and 6.5.

A further criticism was what Larson et al. (1976) felt was the highly unrealistic projected performance scores according to age which Berry and Talbott had made. (Refer to the section on the BTT for the projected performance levels.) The scores of these subjects did support this contention. However, if one looked at the errors made by the majority of the children, in addition to the ones previously described, these additional errors were on a fairly high level for the BTT. These errors included the plurals for the stimulus items "lutz" and "spuz" which require the /-əz/ allomorph, and the derived noun for the stimulus item "bine."

When the higher adult mean scores were compared with those of the children, a maturational effect was suggested. Correlating again with the results of other researchers the majority of the children's responses, even when incorrect, showed evidence of regularity and rule formation. Despite the criticisms Larson et al. (1976) felt the BTT to be a valuable tool in discovering the evolution of a child's morphological development.

Morphological Studies of the Deaf

There has been only one widely reported study on the use of morphological and derivational rules by the deaf. In 1967 Cooper assessed the knowledge of deaf children to apply inflected and derivational suffixes on an instrument modeled on the test devised by Berko. This test utilized nonsense pictures and "words" to elicit the desired morphological form.

In Cooper's (1967) study a paper and pencil test was devised to obtain information about receptive and productive ability. The 140 deaf students ranged in age from 7 to 19 years, and the 176 hearing students had an age range of 7 to 11 years.

Receptive knowledge was ascertained in the following manner. An animal was called a "mogg" and below there were four pictures: one of two moggs, one of a single mogg, one of a mogg with a different animal, and one of a different animal. The children were asked to put an "X" on "moggs."

To determine productive knowledge the child was asked to modify nonsense words cued by a picture. Under the picture was a text of the following type: "This is a man who knows how to hipp. He did it yesterday. What did he do yesterday? Yesterday he (h) _____." If the subjects wrote (h)ipped, it was taken as an indication that productive knowledge of the past tense existed.

There were three types of testing for irregular inflectional patterns. In the first form the students were given a picture, for example, "mife," and read that they were to select the picture of the irregular plural in this example "mives." In the second condition the students were to choose the word that best completed a sentence within a given context, for example, "Mary has a tife. Jack has a tife. They both have two (tife, tifes, tive, tives)." The regular or the irregular form was scored as correct. In the third condition the subjects were required to complete a sentence in a given context, for example, there was a picture of an imaginary animal named a "zife" and there was another picture of two animals similar to the first. The subject had to complete the sentence: "Here are two (z)_____." Credit was given for the regular model response (zifes) or the irregular model (zives).

Comprehension of derivational words was determined by having the child select the best word from a multiple choice array, for example, "Mary knows how to zugg. She zuggs everyday. She knows a lot about: (zuggy, zugged, zuggness, zugging)."

Productive knowledge of derivational words was obtained by requiring the subject to complete a statement, for example, "John's dog has waggs on it. Waggs are all over the dog. It is a (w) _____ dog."

Results indicated the marked superiority of even the youngest subjects over the average score of the 19 year old deaf students. Patterns of item difficulty for the deaf students shadowed that of the hearing students with performance for the two groups being closest on inflectional items and farthest apart on derivational items. Hearing females passed each item clearly and consistently with a corresponding increase in age. This was not the case for the deaf females where the percentage for passing each item increased erratically and inconsistently with chronological age. There was greater discrepancy when scores were compared with chronological age rather than with mental age or reading equivalent. There was an increased tendency for both groups to use the irregular plural with age. Plural nouns and past tense were the easiest items. Next, proceeding from least to most difficult were: 1) progressive, 2) superlative adjective, 3) comparative adjective, 4) third person singular, and 5) derived words.

Cooper's test, as in several of the syntactic tests reviewed in the previous section, was a graphic evaluation, and he thought his test a promising instrument for assessing children's knowledge of certain language rules, however, he cautioned that although written and spoken English have many common features, there is not a one-to-one correspondence between these two communication modes.

Summary of Morphological Assessment

A review of morphological assessment has indicated the following generalizations:

1. Nonsense tests of morphology adapted from Berko's original test (1958) are valid in measuring a child's ability to apply morphological rules to new stimuli. Consistency, regularity, and simplicity are three characteristics which are evident in responses, even if the response is incorrect.

2. These tests of morphology have proved useful in assessing a child's developmental level in morphological rule application and in differentiating among normal and other population groups such as the deaf, the dyslexics, and the mentally retarded.

3. Children always perform better on morphological tests which employ real rather than nonsense items. They first demonstrate morphological usage with true words and then, after some delay, are able to extend this rule to unfamiliar nonsense words.

4. Rate of morphological rule acquisition may vary but the general order of acquisition is preserved. Performance is best on the inflections most frequently used and/or on those having the fewest variants.

5. With adults who have achieved a certain degree of linguistic sophistication because of their educational backgrounds there is a great variety of responses--especially for derived compound words, diminutives, and derived adjectives.

6. The BTT has been shown to be a valid test of morphology and to correlate with other valid language assessment tests (Grammatic Closure Subtest of the ITPA).

7. Cooper's evaluation (1967) was a paper and pencil test. He, himself, cautioned about adopting a one-to-one correlation between graphic and spoken language.

(a) Therefore, in a population like the deaf, who use visual and gestural signals as their primary method of communication, a test of morphological rules presented visually (sign and finger spelling) and requiring a visual response would give more valid information about the deaf's knowledge of morphological rules since the procedure would be in a medium indigenous to them.

(b) An administration of the same test in the traditional graphic manner would determine the extent which medium presentation affects the deaf's responses and if the poor morphological performances could be an artifact of a particular testing procedure, or true ignorance by the deaf for certain morphological rules.

Statement of the Problem

The purposes of this research were to investigate the visual (finger spelled and signed English) vs. the graphic performance of deaf adolescents on linguistic tasks using the BTT and to investigate if a relationship existed between these scores and judgments of FC proficiency. FC proficiency was judged by persons knowledgeable in sign language and finger spelling utilizing a 5 point Quality Scale and a specific Item Analysis Sample which contained the major and minor items of the story. The specific goals of this investigation were:

1. To determine if a method of presentation and response (finger spelled or graphic) would influence the linguistic performance of the deaf.

2. To determine if a relationship existed between BTT scores and the judged level of FC proficiency.

3. To determine if linguistic performance and/or FC were dependent on any of the following variables:

(a) etiology

(b) dB loss in better ear

(c) first language in the home

(d) persons at home who can finger spell and/or sign

(e) age when finger spelling first acquired

(f) number of years at Florida School for the Deaf and Blind (FSDB)

(g) reading level

(h) IQ level

(i) date of birth

(j) race

(k) sex

(l) other impaired family members

CHAPTER III
METHOD AND DESIGN OF THE STUDY

Introduction

This chapter contains the procedures used for subject selection, the experimental tasks performed by the subjects, reliability procedures, and the instruments utilized for analysis.

Procedures

Subjects

Thirty students were randomly selected from among those who were attending the Florida School for the Deaf and Blind (FSDB) who met the following criteria:

1. a hearing loss of 60 dB or greater in the better ear as the primary deficit
2. deaf from birth or prelingually deafened (before the acquisition of speech)
3. a performance IQ score of 95 or higher
4. a reading level equivalent to grade three or higher
5. a monolingual (English) home environment of English, sign, finger spelling, and/or some mixture of all three
6. an age range from 14 - 19
7. a score of at least 75% correct on a researcher developed test of finger spelling ability.

Criteria one through six were obtained from school records. A profile of the subjects of this study is in Appendix A.

Finger Spelling Ability

Potential subjects were given a researcher developed test of picture naming, by finger spelling, in order to determine their ability to finger spell. If a subject failed this task he would have been automatically disqualified from the investigation and another student, possessing the desired criteria, would have been randomly selected and given the Finger Spelling Test. Words ranged in difficulty from the very easy, everyday ones which would be familiar to a first grader, to increasingly difficult and less encountered ones. The most difficult were nonsense pictures where the "names" consisted of letter configurations uncommon to the English language. Naturally for the nonsense pictures the subject was shown the written name. See Appendix B for the test, instructions, procedural protocol, and scoring methods. A passing criterion level of 75% correct was selected.

Tasks

Each student responded to the graphic form of the BTT and the manual form of the BTT. They also retold a simple paragraph story in any manner they preferred. The sequence of these three procedural tasks was randomized for each subject to minimize the possible order effect. Each testing session was individually conducted in a quiet room during regular school hours. The time required for the complete evaluation procedure ranged from 1 hour to 1 hour and 45 minutes, with a mean time of 1 hour and 10 minutes. This mean also included the time necessary

to make any mechanical adjustments on the instruments utilized, such as rewinding of the video presentation tape or changing the tape used in filming the subjects.

BTT Graphic

Each subject responded to 38 questions. The nonsense words and stimuli were presented on 30 plates which had been made into a booklet form. In some instances two stimulus items appeared on a single plate. Instructions were in accordance with the published protocol of the Berry-Talbott Language Tests I: Comprehension of Grammar (Berry, 1966). The first two items were reviewed with the subjects until the examiner was certain that the nature of the task was understood. For succeeding items the child read the stimulus material, responded graphically on his answer sheet, and proceeded to the next page. There was no time limit for this task. Samples of test stimuli, instructions, and answer sheets may be found in Appendix C.

BTT Manual

From previous visits and conversations with students and staff at FSDB it was discovered that some of their signs were slightly different from those which would be used in the manual (visual) presentation. Therefore, to avoid possible confusion, a written list of these signs was presented to each subject before the video viewing. The subject provided the examiner with his sign for a particular word and was given the sign he would see on the video tape.

Before the actual video tape presentation additional instructions were presented in graphic as well as in signed English form. Because of the transient nature of finger spelling, it was important that the

subjects knew that the exact, correct spelling of the stimuli word was not important but that some finger spelled response to each item was expected.

The standard directions, procedures, sentences and nonsense stimuli utilized for the Graphic BTT were presented on a split-screen 19 inch video monitor (Sony, CVM 192-U). On one-half of the screen was a picture of the nonsense stimuli. This plate remained constant while on the other half of the screen the examiner used signed English and finger spelling to communicate the standard graphic stimuli of the BTT. The only procedural difference between the graphic and manual presentations was that in the latter task the subject had a 10 second interval to finger spell his response. There were no repeats of stimulus items once the test had begun.

The subjects were seated about 5 feet from the monitor. A microphone was placed in front of the child to record any vocalizations. All students saw and, if capable of, heard the same video tape film of the test which had been filmed on a portable video camera (Sony AVC 3210). Video recordings of the finger spelled responses of all subjects were made for later scoring.

The signs reviewed prior to the film presentation and additional instructions are found in Appendix D.

FC Task

The subjects were given a story (Form A-G) from the Gray Oral Reading Test (GORT) which had an approximate fourth grade level of difficulty (Grey, 1967). The students were told to read the story to themselves, and when they felt that they were adequately prepared, to retell

the story in any manner they wished. Instructions were presented in graphic, oral, and signed English form. Video recordings of all stories were made. If the student inquired about a particular vocabulary word the examiner explained it. This task placed no time limits on either the reading of the passage itself or on its communication by the subject. See Appendix D for the instructions given and the paragraph taken from the (GORT).

Scoring Criterion

BTT Graphic and Manual

This investigation was concerned with the concept conveyed by certain English morphemes and not, as in several previous studies, the production of particular allomorphs for the same morpheme. Therefore, any indication that the subject did demonstrate appropriate knowledge for the required morpheme was scored as correct. For example, "s" and "es" were both considered as correct responses for the plural, and in the same manner, "ed" and/or "ied" were considered as correct for the past tense.

For the diminutive and compound words the adult models of Berko were utilized. Derived adjectives and nouns, comparatives, superlatives, and possessives were scored correct only when the traditional English morphemes were produced. For example, even if the subject displayed in sign language or finger spelling that he understood the difference between the comparative and superlative but failed to finger spell or write the required "er" or "est" inflections, his responses were scored as incorrect. No one was penalized for misspellings of the nonsense word stems.

The experimenter scored all Graphic and Manual BTT responses. In order to establish an index of reliability of the ratings a hearing, college student of deaf parents who was familiar with signs and finger spelling also scored Graphic and Manual BTT items. He was previously given a short training session so that he would be familiar with the scoring criterion. These responses were then compared with those of the investigator.

The tests scored by the second rater were composites of responses from all of the subjects. The experimenter rank ordered each subject's test scores for both the Graphic BTT and Manual BTT performances. Graphic and manual test scores were very disparate for some subjects. Therefore, it could not be assumed that because someone achieved a certain score in one medium that he would perform similarly in the other medium. After rank ordering the two sets of scores, the highest 10 scores of each medium were designated as the high Graphic and high Manual BTT groups. The next 10 highest scores for each medium were designated as the medium Graphic and medium Manual BTT groups. Finally the lowest scores for each medium were defined respectively as the low Graphic and Manual BTT groups.

The subjects from each group were assigned from 2 through 4 items of the total 38 items of the BTT. This procedure resulted in six composite tests of which three were graphic and three were manual. For each medium there was a separate test for the high, medium, and low groups. (The same type of video recorder utilized for the previous films was again employed for the three new manual films.)

Graphic ratings for the high, medium, and low categories were compared. There was 1.00 agreement between the two raters.

Overall manual ratings had an agreement of .95. Manual ratings for the high category resulted in an agreement of .89. Manual ratings for both the medium and low categories showed a .97 level of agreement. The differences in level of agreement between high, and the medium and low categories is a good illustration of the fleeting nature of finger spelling. For example, many of the subjects in the high category used the sign for the possessive which, unless particularly emphasized, is very difficult to determine as to whether singular or plural possession is indicated. Hence, a value judgment had to be made. None of the subjects in the medium and low categories showed knowledge of the possessive so this value judgment was not necessary.

A normal _z_-test for difference in proportions indicated that there was a significant difference between the graphic and manual ratings at the .05 level with _z_ being equal to 2.51.

FC Rating

Two groups each containing three judges viewed and rated the students' functional communication stores. All of the judged were fluent in signing, finger spelling, and English. Since they were also employed in various capacities with FSDB, all were familiar with any expressions or signs which might be colloquial to that specific geographical location and population. Each of the groups contained one hearing, one deaf, and one hard-of-hearing judge. Both groups saw the same 30 stories; however, in order to avoid a possible order effect, the appearance of the student in each of the two films was randomized. Therefore, the location of a particular student in Group A's film differed from the same student's appearance in Group B's film. (After each story the judges were given a one minute pause to rate their observations.)

All of the judges received their instructions (orally, manually, and graphically) during the same session. However, each group individually scored its own film. Because of the rapidity of the material to be scored, the two groups saw their same films a second time a few hours after their first viewing. They were given abbreviated instructions and were allowed to make changes from their previous observations.

The judges were given a rating sheet which assessed three dimensions of communication. It was on this sheet where they marked their observations. Part A assessed overall communicative efficiency and the quality to convey general concepts on a categorical scale of 1 - 5. This was the Quality Score.

Part B contained an item analysis for specific main and detail ideas of the story. Items were scored according to a 3 point system. A score of 3 indicated the judge was confident that the idea was conveyed in its entirety, a score of 2 indicated that the judge thought the idea to be partially presented, and a score of 1 indicated that the judge was certain that the idea was completely absent.

In Part C the ratio of a student's finger spelling to signing preferences in communication was rated. The scale ranged from 1 (almost total finger spelling) to 5 (almost total signing). (See Appendix F for instructions and the Functional Communication Evaluation Sheet.)

In order to obtain an index of reliability for the ratings of the FC Evaluation the following three questions had to be determined:

1. Were there differences between the six correlation matrices corresponding to each judge?

2. Were there differences in correlation matrices corresponding to each type of judge (Hard-of-Hearing, Deaf, and Hearing)?

3. Was there a difference between the two correlation matrices corresponding of each group (order effect) for the judges?

The correlation between Theme and Quality for all three of the above questions was analyzed by using "Fisher's transformation to approximate normality" (Bruning & Kintz, 1968). An "H" (χ^2) test for homogeneity of correlations (Mendenhall, 1968) was then applied.

The "H" statistic revealed nonsignificant differences: among the six individual judges, among the type of judge, or between groups of judges. Furthermore, since each of the tests for the three questions was performed at the .01 level of significance, the overall sum level was less than .03. This indicated similar judgments by raters, hearing type, and group. It can therefore be inferred that for this evaluation FC ratings were reliable.

Analysis

To determine whether a method of presentation and response (graphic or manual) would influence the linguistic performances of the deaf a t-test for related pairs was utilized (Mendenhall, 1975).

In order to answer questions two and three of the Problem Statement, a single measurement for FC proficiency was needed so that correlations between this measurement and Graphic BTT, Manual BTT, and demographic data could be computed.

The logical measurement for FC would be the average ratings of the judges on the overall Quality Score. This would be a simple and good measurement if it could be shown that the judges arrived at the Quality Score after careful consideration of all factors on the FC Evaluation Sheet.

The Statistical Analysis System (SAS) Forward Stepwise Procedure (Service, 1972) selected an 11 variable model for the dependent variable, Quality. This Stepwise Procedure first selected the variable that predicted most of the variance for the dependent variable (in this case, Quality). The procedure then continued to select the next most important variable responsible for variance of the dependent variable. The addition of each new variable and consequent formation of a new model continued until all of the independent variables were included (in this case, the main and detail ideas and Theme of the FC Evaluation Sheet). Probability levels, R^2s, and F-ratios for each of the models were also determined by the Forward Stepwise Procedure.

The 11 variable model for Quality had an R^2 of .98 with all factors except Theme statistically significant at the .01 level, $F(29,18) = 89.53$, $f < .01$. The significant factors were main topics A,B,D,E, and details A-F. These factors were needed to predict the Quality Score, and it appears that the judges, on the average, carefully considered those factors in determining their Quality Score.

It is thus inferred that the Quality Score is a good measurement of FC proficiency. Refer to Tables 1 and 2 at the end of this section for the SAS model, the identification of the variables chosen, and their occurrence in the paragraph which the students read.

To determine whether a relationship existed between the BTT scores (graphic and manual) and the judged level of FC, the variables, as indicated by the correlation coefficients printed by the SAS, were observed for significance levels of .05 or higher.

The demographic data (etiology type, dB loss in the better ear, first language in the home, persons at home who can finger spell and/or

sign, age when finger spelling was first acquired, number of years at FSDB, reading level, IQ, age, race, sex, and other impaired family members) had its significance to the Graphic BTT, Manual BTT, and FC models determined by the Forward Stepwise Procedure of the SAS. For any of the three models the demographic variables were considered significant at the .05 level or higher.

Table 1

Stepwise Regression Model for the Dependent Variable, Quality Score, as Selected by the Forward Stepwise Procedure of the SAS

R^2 = 0.9820	F RATIO = 89.53	PROBABILITY F = 0.0001
VARIABLES	F RATIO	PROBABILITY>- F
Theme Score	2.05	0.1690
Main Topic A	7.74	0.0123**
Main Topic B	6.67	0.0188**
Main Topic D	31.14	0.0001**
Main Topic E	11.30	0.0035**
Detail A	10.90	0.0040**
Detail B	8.54	0.0091**
Detail C	38.18	0.0001**
Detail D	6.64	0.0190**
Detail E	9.86	0.0057**
Detail F	17.35	0.0006**

* Significant at .05 level
** Significant at .01 level

Table 2

Theme, Main Topics, and Detail Topics from the
Functional Communication Evaluation: Part B, Item Analysis

THEME:

Airplane pilots have many jobs.

MAIN TOPICS		DETAIL TOPICS	
A:**	transportation between cities	A:**	of people
		B:**	of freight
		C:**	of mail
B:**	rescues	D:**	at land
		D:**	at sea
C:	dropping food	F:**	to hungry people
		G:	to hungry animals
D:**	bringing znimals to zoos from the jungles		
E:**	act as traffic police	H:	spot speeding cars
		I:	on the highway

* Significant at .05 level
** Significant at .01 level

CHAPTER IV
RESULTS

Introduction

Data concerning the linguistic performance on the Graphic and Manual BTT are presented in the initial section of this chapter. Correlational data among Graphic BTT, Manual BTT, and judged level of FC are found in the second section. Particular demographic data are presented in the final section. Because the interaction among some of these variables was of interest, there is some overlap introduced in the various tables. Consequently, Tables 3 through 8 are collectively presented at the end of this chapter.

Linguistic Performance on Graphic and Manual BTT

A paired difference *t*-statistic revealed that there was a significant difference in linguistic performance dependent on graphic or manual presentations and responses. The -3.59 *t*-statistic indicated a difference in average test scores for the two methods at the .05 level of significance. The negative *t*-statistic indicated that average test scores for the Graphic method are significantly higher than those for the Manual method. Table 3 shows the subjects' individual scores for the Graphic and Manual BTT tasks.

Table 4 contains a description of the graphic and manual performances. The range for graphic performances was 5 - 33 with a mean of

18.33. The range for manual performance was 4 - 30 with a mean of 15.93. The transient nature of finger spelling as well as the timed response period allowed may be responsible for the better performance with the graphic medium. Nevertheless, it may be inferred that for linguistic tasks of this type a graphic presentation is a valid procedural method for assessing the linguistic ability of the deaf.

Correlations Among Graphic BTT, Manual BTT, and the Judged Level of FC Proficiency

Correlations among the Graphic BTT, Manual BTT, and the judged level of FC proficiency were obtained from the linear regression model of the SAS. The information in Table 5 indicates a correlation between Graphic BTT and Manual BTT scores of .79 which is statistically significant at the .01 level.

This is not surprising considering that the same test and protocol had been utilized with the only manipulated variables being those of presentation and response. These scores may also be viewed in regard to the ability of the deaf to perform in a similar manner for two entirely different communication modes. Thus the elaborate testing procedures necessary for a visual presentation and response would not be necessary in order to obtain a measurement of linguistic competence similar to the one utilized in this study.

Table 5 reveals a correlation of .55 between the Graphic BTT score and the quality FC score which has a statistically significance level of .01. Both the Graphic BTT and FC ratings were dependent on some form of reading ability which may have influenced this correlation to some extent.

The correlation between the Manual BTT scores and quality FC scores was .31 at a significance level of .09. Thus Manual BTT scores and quality FC scores lacked statistical significance at the .05 level. However, a .09 significance level might suggest to some investigators that Manual BTT scores should not be completely discounted.

In summary, Graphic and Manual BTT scores were significantly correlated at the .01 level. Similarly, Graphic BTT scores and FC quality scores were correlated at the .01 level. However, Manual BTT scores and FC quality scores were not statistically significant at the .05 level. It can therefore be inferred that the Graphic BTT may be used as a predictor of FC quality.

Demographic Data

Linear regression models, as selected by the Forward Stepwise Procedure of the SAS, were used for all of the independent demographic variables. Each variable was investigated for its contribution to the following models: the dependent variable Graphic BTT, the dependent variable Manual BTT, and the dependent variable FC.

The best linear regression model for the Graphic BTT (Table 6) explained 63% of the total variance in graphic scores; the manual model (Table 7) explained 60% of the total variance in manual scores; the FC model (Table 8) explained 80% of the total score variance. Criterion for entry of a particular demographic variable into a model was a minimum significance level of .50.

Etiology

There were 19 students who were deaf from birth and 11 who acquired deafness prelingually. For the combined group of subjects

etiology was found to be the following: 13 - unknown, 7 - rubella, 3 - birth trauma, 3 - heredity, 2 - meningitis, 1 - Rh factor, 1 - encephalitis.

The above seven levels of the variable etiology were analyzed in a dichotomous-comparison format. For example, the rubella factor was compared against all of the other six etiologies or the hereditary factor was compared against all six of the remaining etiological factors.

The factor of heredity was included in the Manual BTT model, $F(29,23) = 8.45$, $f < .01$. It can then be inferred that heredity significantly contributes to a positive performance on the Manual BTT. This result further supports findings of previous investigators that deaf children of deaf parents, who thus have an early exposure to a manual communication system, perform better than deaf children of hearing parents who are denied this early exposure.

Encephalitis was included in the FC model, $F(29,15) = 5.19$, $f < .05$. However, there was only one subject whose etiology was that of encephalitis so the correlation with FC should be assessed with that factor in mind.

dB Loss

According to Silverman (1971) the term "deaf" is used for children "who do not have sufficient residual hearing to enable them to understand speech successfully, even with a hearing aid, without special instruction" (p.399). He used Huizing's classification (1953) which related loss as expressed by pure-tone audiometry. The suggested categories pertinent to this study were:

Grade III: 60 - 90 dB = severe loss

Grade IV: More than 90 dB = deaf (no speech understanding ability) (p. 401).

The subjects in this investigation had a dB loss ranging from 62 - 118 (94.97) in the better ear. The obvious conclusion is that all subjects were severely hearing impaired.

For both the Graphic and Manual BTT models the variable dB loss was not even included in the model. This would concur with the results of other investigations which found this variable (for the severely hearing impaired) to be insignificant for academic success. However, in the FC model this variable was statistically significant, $F(29,15) = 5.90$, $f < .05$. Other studies of signing in the deaf have been more concerned with the properties of the communication medium itself and have not, to my knowledge, investigated the specific amount of loss once it was ascertained that the subject was deaf.

Reading Level

The main reading level of the subjects, obtained from the school's records on the Stanford Achievement Test (SAT), revealed a score of 5.3 (fifth year, third month) with a standard deviation of 2.3. The individual levels ranged from 1.7 - 9.9.

Reading level was the only variable of statistical significance on the Graphic BTT $F(29,19) = 6.47$, $f < .01$. On the Manual BTT model reading level was again the most statistically significant variable, $F(29,23) = 17.59$, $f < .01$. The fact that reading level was also the most statistically significant variable on the FC model, $F(29,15) = 10.62$, $f < .01$, emphasized that this variable was by far the most powerful for all three tasks which were investigated. Other researchers

have also found reading level to be one of the most important variables for high linguistic performance.

Age When Finger Spelling First Acquired

Finger spelling acquisition ranged from almost at birth (in cases of deaf children of deaf parents) to age 15. This variable was statistically significant in the Manual BTT model, $F(29,23) = 4.95$, $f < .05$. This significance is in agreement with the data collected by previous researchers which stressed early exposure to finger spelling for its maximum benefit for the deaf's communication to be achieved.

Age

The subjects for this investigation ranged in age from 16 - 18. The median age was 17.13 years with a standard deviation of .50.

Only for the Manual BTT was this variable statistically significant, $F(29,23) = 7.27$, $f < .01$. With the subjects' ages so close together it is difficult to discern why this should be such a significant variable and only for the Manual BTT model.

First Language in the Home

English was the primary language in the home for 27 students. Sign was the primary language for two students, and one student reported a combination of English and sign as the language of the home.

These three levels of the variable first home language were analyzed in a dichotomous-comparison format where no level reached the significance level for inclusion in any of the models.

Other Hearing Impaired Family Members

From among all of the students in this study only 3 subjects reported that other members of their immediate family were hearing impaired. This variable lacked significance for all three models. The low number of subjects included in this variable may be one of the reasons it was statistically insignificant.

Persons at Home Who Can Finger Spell and/or Sign

The above variable contained three levels which were analyzed in a dichotomous-comparison format where no level attained any statistical significance for any model. No manual communication at home was reported by 10 students, 13 reported some manual communication, and 7 reported that manual communication was frequent at home.

The lack of significance for the last three variables cited--first language in the home, other hearing impaired family members, persons at home who can finger spell and/or sign--may all lack significance for similar reasons. The subjects in this study were older students who lived in the institutionalized environment of FSDB where everyone finger spelled and signed. There would be the possibility that the effect of the family was replaced by that of a peer group.

Number of Years of Attendance at FSDB

The administrators and school records assured the researcher that all of the subjects had had some prior educational experience if they had entered FSDB later than age 4 or 5--which is the earliest program level for the school. The actual years of attendance at FSDB ranged from 1 through 12 with a mean of 6.66 years and a standard deviation of 4.08.

This variable was included in both the Graphic BTT and FC models but at statistically insignificant levels. The fact that years of attendance was completely excluded from the Manual BTT could be a possible argument that this variable had no statistical significance relative to performance on the tasks of this investigation.

IQ

The subjects' IQ scores, when measured on the performance test of the Wechsler Test of Intelligence (WISC), yielded a range of 95 - 133 with a mean of 112.53 and a standard deviation of 10.05.

This variable was found to be insignificant for all three models. Other investigators have also found little significance between IQ and performance on linguistic tasks.

Race

There were 26 white subjects and 4 black subjects. This variable was insignificant for all three models; thus it can be inferred that race was not a significant variable for the tasks of this investigation.

Sex

There were 21 male and 9 female subjects in this investigation. This variable did not meet the .50 significance level for even entrance into the three models.

Summary of Results

The summary of results is presented in reference to the specific goals of this investigation which were presented in the "Statement of the Problem" section.

1. The methods of presentation and response--graphic and manual--of the BTT did influence the linguistic performance of the deaf. The Graphic BTT scores were higher than the Manual BTT scores at the statistically significance level of .01.

2. Graphic BTT scores and the judged level of FC proficiency were highly correlated at the statistically significant level of .01. However, correlations between Manual BTT scores and FC proficiency were statistically insignificant at the .05 level of confidence. Graphic BTT scores and Manual BTT scores were both significantly correlated at the .01 level.

3. The particular demographic variables which significantly influenced performance on the Graphic BTT, Manual BTT, and FC were:

(a) Graphic BTT

(1) Reading level (significant at the .01 level)

(b) Manual BTT

(1) Reading level (significant at the .01 level)

(2) Etiology--Heredity (significant at the .01 level)

(3) Age (significant at the .01 level)

(4) Age of Learning Finger Spelling (significant at the .05 level)

(c) FC Rating

(1) Reading Level (significant at the .01 level)

(2) dB Loss (significant at the .05 level)

(3) Etiology--Encephalitis (significant at the .05 level)

Table 3

Subjects' Individual Scores for the
Graphic BTT, Manual BTT, and FC Ratings

SUBJECT	GRAPHIC BTT[a]	MANUAL BTT[b]	FC RATING[c]
01	17	18	2.66
02	13	07	2.33
03	18	16	3.16
04	20	19	3.00
05	19	15	2.66
06	16	14	1.33
07	14	10	1.00
08	33	29	3.33
09	13	15	2.00
10	13	12	2.00
11	16	17	3.16
12	28	22	4.30
13	18	17	2.66
14	18	20	4.00
15	18	14	2.83
16	16	05	3.00
17	14	15	3.83
18	24	20	2.83
19	15	08	1.66
20	19	17	4.00

Table 3 - continued

SUBJECT	GRAPHIC BTT[a]	MANUAL BTT[b]	FC RATING[c]
21	27	30	3.00
22	19	19	2.83
23	22	13	4.66
24	05	04	1.00
25	26	21	4.16
26	20	20	1.16
27	17	17	1.50
28	19	15	1.00
29	19	11	4.33
30	18	14	2.33

[a] score out of a possible 38 correct
[b] score out of a possible 38 correct
[c] average of judges' ratings on a scale from 1 - 5

Table 4

Mean, Standard Deviation, Minimum and Maximum Scores for the Graphic BTT, Manual BTT, and FC Tasks as Obtained from the Linear Regression Model of the SAS

VARIABLES	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
Graphic BTT[a]	18.9333	5.3777	5.0000	33.0000
Manual BTT[b]	15.9333	5.9302	4.0000	30.0000
FC[c]	2.7193	1.1135	1.0000	4.6600

[a] total of 38 items
[b] total of 38 items
[c] based on Quality Score which had a 1 (very poor) to 5 (very good) scale range

Table 5

Correlation Coefficients among
the Graphic BTT, Manual BTT, and FC Scores
as Shown by the Correlation Procedure of the SAS

VARIABLES	GRAPHIC BTT	MANUAL BTT	FC
Graphic BTT	1.00000 0.00000	0.79545 0.00010**	0.55112 0.00160**
Manual BTT	0.79545 0.00010**	1.00000 0.00000	0.31372 0.09140
FC	0.55112 0.00160**	0.31372 0.09140	1.00000 0.00000

* Significant at .05 level
** Significant at .01 level

Table 6

Linear Regression Model for the Dependent Variable, Graphic BTT, as Selected by the Forward Stepwise Procedure of the SAS

R^2 = 0.6387	F RATIO = 3.36	PROBABILITY F = 0.0111
VARIABLES	F RATIO	PROBABILITY > F
Age of Learning Finger Spelling	1.78	0.1975
Years Attending FSDB	.74	0.4008
Reading Level	6.47	0.0198**
IQ	2.01	0.1727
Race	1.06	0.3160
Etiology - Unknown	2.46	0.1333
Etiology - Rubella	1.29	0.2703
Deaf at Birth	0.55	0.4671
No Manual Communication at Home	2.25	0.1504
Finger Spelling to Sign Ratio	1.06	0.3153

* Significant at .05 level
** Significant at .01 level

Table 7

Linear Regression Model for the Dependent Variable, Manual BTT, as Selected by the Forward Stepwise Procedure of the SAS

$R^2 = 0.6013$	F RATIO = 5.78	PROBABILITY F = 0.0009
VARIABLES	F RATIO	PROBABILITY>F
Age of Learning Finger Spelling	4.93	0.0365*
Reading Level	17.59	0.0003**
IQ	2.14	0.1567
Age	7.27	0.0129**
Etiology - Heredity	8.45	0.0080**
No Manual Communication at Home	1.58	0.2083

* Significant at .05 level
** Significant at .01 level

Table 8

Linear Regression Model for the Dependent Variable, FC (Utilizing Quality Score as the Unit of Measure), as Selected by the Forward Stepwise Procedure of the SAS

$R^2 = 0.8002$	F RATIO = 4.29	PROBABILITY F = 0.0041
VARIABLES	F RATIO	PROBABILITY > F
Age of Learning Finger Spelling	0.42	0.5279
Years Attending FSDB	0.72	0.4090
Reading Level	10.62	0.0053**
Age	2.12	0.1658
Other Hearing Impaired in Family	1.03	0.3267
Etiology - Heredity	3.49	0.0816
Etiology - Rubella	1.39	0.2565
Deaf at Birth	0.66	0.4304
Some Manual Communication at Home	0.96	0.3425
dB Loss	5.90	0.0282*
Finger Spelling to Sign Ratio	4.11	0.0608
Etiology - Meningitis	0.86	0.3687

Table 8 - continued

R^2 = 0.8002	F RATIO = 4.29	PROBABILITY F = 0.0041
VARIABLES	F RATIO	PROBABILITY > F
Etiology - Encephalitis	5.19	0.0378*
Presentation Order of Tasks	1.33	0.2670

* Significant at .05 level
** Significant at .01 level

CHAPTER V
SUMMARY AND DISCUSSION

Discussion of the results of this investigation is designed so that the major findings relating to the two specific research questions (linguistic presentation methods and possible relationships between specific linguistic scores and the functional communicative effectiveness of AMESLAN) are presented first. The influence of demographic factors is later introduced. Finally, suggestions for language intervention and implications for future research are presented.

Morphological Assessment

Introduction

The linguistic performance of the deaf as a result of two presentation methods was the initial research question. The primary objective was to determine if written linguistic tasks adequately reflect the deaf's linguistic knowledge or is their poor performance a reflection of their difficulty with the medium of presentation rather than with the material itself?

Graphic and Manual BTT

A paired difference *t*-statistic revealed a significant difference ($p < .05$) in linguistic performance dependent on mode of presentation with the average scores for the graphic method (18.93) significantly higher than that for the manual method (15.93). It can therefore be

inferred that for investigations of this type assessments of the comprehension of graphically presented materials provide valid, indeed superior, indications of linguistic competency of traditional English by the deaf.

Discussion

Among the interesting and plausible hypotheses for the above results are error hierarchy, nature of the test format, and specific types of errors. These topics are discussed in the following section.

Hierarchy of Errors

An analysis of errors for this study revealed a hierarchy of item difficulty similar to that of Cooper's (1967) investigation (see Chapter II, Morphological Research). In this investigation, as in Cooper's (1967), plural nouns and past tense were also found to be the easiest items and the derivational items the most deviant. The four items which were missed by more than half of Larson et al.'s (1976) adult models (derived words: diminutive, compound, ajentive, adjective) were also incorrect for the vast majority of the FSDB students.

Table 7 shows the morphological hierarchy according to percentages correct for both the graphic and manual presentations. Table 8 illustrates the percentages correct for each morphological structure accordint to the graphic and manual procedures.

Plurals and past tense were apparently the easiest items. Generally both graphic and manual presentations followed the same hierarchy but with the manual scores far more depressed than the graphic scores. With performance on derived words so poor for both presentations it would be difficult to make any comparisons between the two groups of scores. However, the manual presentation did aid some students in the

Table 7

Hierarchy According to Percentages Correct
for Graphic BTT and Manual BTT

ORDER	GRAPHIC BTT	% CORRECT	ORDER	MANUAL BTT	% CORRECT
1	Plurals	.93	1	Plurals	.85
2	Past Tense	.75	2	Past Tense	.63
3	Progressive	.33	2.5	Progressive	.18
4	Possessive Singular	.25	2.5	Adjective Superlative	.18
5	Third Person Singular	.18	5	Possessive Plural	.15
6	Adjective Superlative	.17	6	Adjective Comparative	.13
7	Adjective Comparative	.13	7	Third Person Singular	.01
8	Possessive Plural	.01	8	Possessive Singular	.008
9	Derived Word N[ajentive(-er)]	.13	9.5	Derived Word N[ajentive(-er)]	.006
10	Derived Word Adjective	.006	10	Derived Word N(diminutive)	.006
11	Derived Word N(diminutive)	.003	11	Derived Word N(compound)	.002
12	Derived Word N(compound)	0	12	Derived Word Adjective	0

Table 8

Percentages Correct for Morphological Structures
for Graphic BTT and Manual BTT

GRAPHIC BTT	STRUCTURE	MANUAL BTT
.93	Plural	.85
.75	Past Tense	.63
.33	Progressive	.18
.30	Comparative Adjectives	.31
.17	Superlative	.18
.13	Comparative	.13
.26	Possession	.158
.25	Singular	.008
.01	Plural	.15
.133	Derived Nouns	.014
.13	Ajentive(-er)	.006
0	Compound	.002
.003	Diminutive	.006
.006	Derived Adjective	0

formation of the compound word (.002 correct) as compared with the graphic score (0 correct) for the same structure and for plural possession (.15 correct as opposed to .01 correct).

Nature of the Test Format

This section is a comparison between the properties inherent in the graphic and manual test presentations which could account for the superior graphic performances.

Age of finger spelling acquisition. Although finger spelling is employed in classroom instruction at FSDB, the age of finger spelling acquisition by the subjects varied from early infancy to age 15. The importance of early exposure to finger spelling and its beneficial impact on later communication and educational achievement has been well documented (Hoemann, 1974; Hoemann, Andrews, Florian, Hoemann & Jensema, 1976; Quigley, 1969).

Not only finger spelling, but any systematic, intensive language exposure at the preschool level has been found beneficial for later scholastic achievement (Sarachan-Deily & Love, 1974).

Nature of finger spelling. Transient and ephemeral qualities are characteristic of finger spelling and signed English (Fisher & Husa, 1973). These variables demand much visual alertness and concentration. It was perceived by the experimenter in this study that in the majority of cases, if the crucial nonsense stimuli or question was not seen by the subject, his manual response was incorrect. This was observed for test items where the subject consistently responded correctly for a particular structure. Therefore there was little doubt that the student lacked knowledge for the test item.

This ephemeral quality also applies to the production of finger spelling. Some letters (i.e., z, l) have several distinctive characteristics which render them easy to make and to discern. Other letters and symbols have nearly identical features (i.e., e, s) or very fleeting markers (i.e., possession) which often render them very difficult to read. Concentration is demanded not only of the reader but also of the finger speller to make clear distinctions for his responses. If the finger speller is careless, it is very easy for the reader to mistake an "s" for an "e" or to mark a possessive item as plural when the signer intended singular.

Time limitations. The difficulties mentioned above for finger spelling and signed English were not present in the graphic test. No time limit was imposed on this task where the student had the nonsense stimuli immediately before him. In contrast, the manual video tape recording had a specific time limit for each response.

Monitor viewing. In order to insure that all subjects saw the same presentation it was necessary to record the test on video tape. There could be some differences between observing a live finger spelling presentation and observing the same presentation on a large monitor.

From the features cited for test format it could be argued that the manual presentation failed to accurately reflect a student's knowledge of morphological rules when forced to depend solely on a fleeting visual medium with the additional aids of lip reading skills and residual hearing.

Error Types

Several distinct types of errors were observed for many students on the graphic and manual presentations. These error types are presented in the following section.

Erratic. For many items (as in comparative, possessive, and derived words) it was apparent that the subjects were uncertain as to the correct morphological inflections. The responses for graphic and manual presentations for the same item were different, but in both presentations responses were incorrect and often erratic. In many cases students merely repeated the nonsense word or substituted a real word for a picture of some real object which appeared on the stimulus card. In these instances mode of presentation had no effect. The student was apparently unaware of the required response and concept.

Knowledge of concept. In some cases the subjects indicated no knowledge of the comparative and superlative constructions on the graphic presentation. However, in the manual presentation there was an indication of knowledge of these two concepts. For example, in these cases the student finger spelled "more liggy" and "even more liggy" for the comparative and superlative respectively. These responses are equivalent as to how the concepts comparative and superlative are signed. Responses of this nature were scored as incorrect as it was the correct morphological inflection which was desired. However, examples of this type are an indication that manual presentation can facilitate knowledge or concept recall, albeit not in the traditional English form where a graphic presentation would not do so.

Sporadic and/or confused responses. Performance on this morphological test was frequently sporadic. For example, past tense or plural

items would be correctly answered except for one or two. This was observed for both graphic and for finger spelled responses where the examiner felt confident that the subject had observed the stimulus item.

Sporadic knowledge of general information by the deaf has been observed by classroom teachers. Therefore, simply because mastery of the superlative is indicated, knowledge of the comparative should not be assumed.

There was also evidence of confusion for certain structures, as in the possessive. Several subjects employed "nad's" for the singular possessive, but no knowledge of plural possession was demonstrated. Or the superlative adjective would be consistently employed for the comparative and, depending on the individual subject, would or would not be correctly utilized for the superlative item.

Another illustration of this confusion was that the subject would correctly respond for some items and often respond incorrectly for similar items of the same construction. These incorrect responses were consistent and not mere haphazard answers.

Hypotheses. These inconsistencies could be interpreted in various ways. The correct finger spelling of how the comparative and superlative are signed could be an example of the "language interference" hypothesis. This is a phenomenon experienced by many of the deaf between traditional English and some sort of signing system. It can be compared to the language interference of a young child in a bilingual environment.

The sporadic and confused inconsistencies may be viewed as an intermediate state that exists prior to the acquisition and consistent usage of the correct structure. Or, considering the age of the subjects and the simple structures under scrutiny, the inconsistencies

could be attributed to a confused comprehension for a particular structure. Yet another hypothesis could utilize some of these errors as evidence that the deaf were employing two strategies for the same structure.

Pressnell (1973) suggested that some differences found in the sequential order of development for particular verb constructions could be related to the teaching order in the classroom. Deviations which coexist with the correct forms of syntactic structures might indicate that some of the deaf have two or more parallel rules for the same syntactic structures (Quigley, Smith, & Wilbur, 1974).

In summary the consistency, regularity, and simplicity characteristic of hearing children's responses was lacking. Cooper (1967) also found this true for his older deaf female subjects.

Correlations Among Graphic BTT, Manual BTT, and FC Scores

Introduction

The second area of research was concerned with the communicative effectiveness of the deaf when they were allowed to utilize whatever signalling system they preferred--finger spelling, AMESLAN, signed English, gesture, and speech. The specific research qeustion was to determine the extent of the relationship between the linguistic BTT scores and a judged level of FC proficiency when the students were allowed to utilize their preferred method of communication.

Graphic BTT, Manual BTT, and FC Scores

Correlation coefficients of the SAS revealed the Graphic BTT and Manual BTT scores to be statistically significant at the .01 level.

The Graphic BTT and FC scores were also statistically significant at the .01 level. The Manual BTT and FC scores lacked statistical significance at the .05 level.

Discussion

In this section the correlation coefficients of the above results are reviewed. Possible relationships with reading and writing as well as cognitive implications are presented.

Correlations with Reading and Writing

The fact that analysis revealed a high correlation between the Manual and Graphic BTT is not too surprising. The only variable which distinguished the two tests was manner of presentation.

Perhaps the high correlation between the Graphic BTT and the FC score could be explained by the fact that both tasks involved reading. Cooper (1967) found that his morphological test scores were related to reading achievement although a subsequent investigation indicated that difficulties in reading test items did not depress test scores. The reading level of the BTT was very low--about the level of the first grade. And from an analysis of error patterns it can be concluded that errors resulted from lack of linguistic knowledge rather than from difficulty with the medium.

The paragraph which the subjects read was near the fourth grade level, but, as the purpose of the investigation was communicative ability, the investigator, when necessary, signed the story and helped the subjects with unfamiliar words. It is always difficult to change from one medium (the graphic paragraph) and measure communication in another medium (AMESLAN). The question might be posed that it would have been

more suitable for the paragraph story to be signed to the subject and thus possibly avoid confusion transference from one medium to another. However, it must be remembered that because of the transient nature of signing, another variable, memory, which the investigator had hoped to minimize as much as possible, would have become even more important. Support for this statement may be found in this study where students did not respond to BTT items where they would have known the answer because they missed the stimulus word.

The judges rated the communication effectiveness of most of the students as slightly below average with the mean score of 2.71. From previous investigations of the written compositions by the deaf (Quigley, Smith, & Wilbur, 1974; Russell, Quigley, & Power, 1976), it would be valid to suppose that if the subjects were instructed to write what they remembered from the paragraph, the communication effectiveness as judged by traditional linguistic standards might be evaluated as very far below average. With one exception the morphological scores of this investigation were lower than those obtained by Cooper's (1967) 9 year old hearing subjects. However, the judges' ratings of FC would imply that the deaf, when allowed to utilize and be evaluated on their own communication system, can adequately communicate ideas and concepts based on their scored performance for conveying the main ideas of the Item Analysis of the paragraph.

Memory for Prose and Cognitive Implications

An important variable in obtaining a measurement of FC is memory. Several studies have been conducted on memory for prose but none have been attempted with the deaf. Inferences on prose memory are made from

data which utilize short memory units--letters, designs, sentences. All items in the paragraph story were assigned hierarchical categories according to a theory of Kintsch (1977) (see Section 2, Chapter II).

The selected variables tended to support some of Kintsch's (1977) findings on preliminary studies with hearing subjects. Superordinates (main topics) with a mean score of 1.70 (utilizing a 3 point rating system) were defined best. Subordinates (details) with a mean score of 1.65 were recalled less often. Kintsch noted that the thematic idea was the best recalled item in the hierarchy. This was also valid for the subjects in this study who had a mean score of 2.48 for Theme. The fact that Theme was recalled so well by the majority of students may be the reason it lacked statistical significance in the model used to predict Quality Score.

There is meager information available on prose recall. However, it appears that for the FC task of this study the ability of the deaf to remember prose was similar to that of hearing subjects.

Demographic Assessment

Introduction

The demographic data included in this study were reading level, etiology, age of learning finger spelling, dB loss in the better ear, age of the subject, first language in the home, persons at home who can finger spell and/or sign, other impaired family members, number of years at FSDB, IQ level, race, and sex. The investigator wished to determine which of the above variables significantly contributed to performance on the Graphic BTT, Manual BTT, and FC tasks.

Significant Variables

Reading level was the only variable significant for all three models (.01). It was the only significant factor for the Graphic BTT model. For the Manual BTT the statistically significant variables were etiology-heredity (.01), age of the subject (.01), and age of learning finger spelling (.05). Although many variables were included in the FC model, the only statistically significant ones were dB loss (.05) and etiology-encephalitis (.05).

Discussion

All variables that were included in this study are dealt with in this section. The most significant variables for the three investigative tasks are presented first.

Reading Level

This was the most significant variable as it contributed to all three task measures at the .01 level. This high correlation of reading level and linguistic performance would be in agreement with the data of the previous investigations (Anderson, 1974; Anken & Holmes, 1977; Quigley, Wilbur, & Montanelli, 1974; Russell, Quigley, & Power, 1976; Scholes et al., in press; Scholes et al., 1976; Stokoe, 1975; Wilbur et al., 1975; Wilcox & Tobin, 1974).

This is not surprising since reading level would involve comprehension of written material; therefore, for these subjects the greater the linguistic sophistication the higher the Graphic BTT and FC rating. Both of these tasks required some reading ability. The fact that reading level was also significant for the Manual BTT could be attributed to the fact that the manners of presentation (finger spelling and signed

English) are both visual overlays on traditional English and the manual responses were scored as to the correct English morphemic response. The high significance of reading level on all three tasks could also be attributed to the factor of linguistic sophistication not only for traditional English but also in the ability to successfully communicate in AMESLAN.

Etiology

For this variable seven levels were analyzed in a dichotomous-comparison format. The seven levels were unknown, rubella, birth trauma, heredity, meningitis, Rh factor, and encephalitis.

Heredity, significant at the .01 level, was one of the four statistically significant variables for the Manual BTT model. Researchers have found that deaf children of deaf parents usually have a higher scholastic achievement level than deaf children of hearing parents. This factor has been attributed to the fact that the deaf children are immediately given some form of communication system (Bellugi & Fischer, 1972; Cutting & Kavanagh, 1975; Kannapell, 1974; Stokoe, 1975; Vernon & Koh, 1971).

There were only two deaf students of deaf parents included in this study. Two other subjects had an etiology diagnosed as heredity, but these students had deaf siblings not deaf parents.

Encephalitis was significant on the FC rating at the .05 level. However, there was only one subject with this specific etiology and for lack of similar findings in other investigations this significance level and particular etiology should be regarded with some reservations. Heredity was also included in the FC model but lacked statistical significance.

There are a number of possible reasons why other etiologies are not included in the models or do not appear as significant (as previous research would suggest). There were only 30 subjects in this study. The dichotomous-comparison of each type of etiology against all of the other etiologies may have caused a levelling effect. Or perhaps there was somewhat of an overlap with one level of etiology and other variables in the study. For example, the age of learning finger spelling might be associated with heredity as well as other variables such as the number of hearing impaired in the home and/or the frequency of manual communication. Finally, one of the criteria of the study was that there be no handicap other than deafness. Therefore, subjects with other handicaps of etiologies known for associated anomalies, as in rubella, which might affect performance were automatically eliminated from this study.

Age of Learning Finger Spelling

This variable was statistically significant in the Manual BTT model at the .05 level. This result supports other researchers who have reported that the effectivness of finger spelling is related to the age at which it is introduced (Hoemann, 1974; Quigley, 1969). The age range for these subjects was birth to age 15 with a mean of 6.9.

dB Loss

The dB loss in the better ear was not included in the models for Graphic and Manual BTT scores. Previous researchers and classroom teachers have discovered that this variable has no influence on the linguistic and scholastic performance of deaf and hard-of-hearing students (Anderson, 1974; Scholes et al., in press).

Surprisingly, dB loss was a statistically significant factor in the FC model at the .05 level. To this investigator's knowledge, dB loss has not been included as a variable in AMESLAN communication studies.

The subjects in this study with high FC ratings [3.00 (average) to 5.00 (very good)] had (a) a variety of etiologies, (b) a wide range of dB loss, and (c) a variety of communication preference styles (signs, finger spelling, gestures accompanied with or without speech). All of the subjects had a reading level of 3.2 or higher; however, four subjects with an FC rating lower than 3.00 also had reading scores higher than 3.2 This is an intriguing finding which can easily be further investigated in future AMESLAN communication studies.

Age of the Subjects

This variable was statistically significant (.01) for the Manual BTT model. Considering the narrow age range and median age of the subjects (16 - 18 and 17.13, respectively), this was a rather surprising finding. It would be expected, as in Cooper's (1967) subjects of ages 9 - 19, that age would be important if only for the reason that the deaf are grossly delayed in the acquisition of some rather elementary structures. However, with the older subjects in this study some hypothesis other than mere delay should be entertained for the inferior performance by these deaf students. Nevertheless, the fact that age was significant for these students for this particular task is puzzling. It may be that a difference of two years could affect the subject's ability to concentrate over an extended period of time on the video tape presentation. Or it may be that there is a peak in performance for the coordination of motor, visual, and linguistic skills that does

not develop or is still in the process of developing during this age span.

First Language in the Home

There were three levels for this variable. The majority of the students (27) reported English as the first language in the home, 2 students reported sign, and 1 student reported a combination of the above communication systems.

Persons at Home Who Can Finger Spell and/or Sign

There were three levels for the above variable. Some manual communication was reported by 13 students, 10 students reported no manual communication, and 7 students reported that manual communication was used frequently at home.

Other Hearing Impaired Family Members

Seven students reported other family members (siblings and parents) who were also hearing impaired.

These last three variables failed to be of any significance for the Graphic BTT, Manual BTT, or FC measures. This lack of significance could be caused by the dichotomous-comparison format of three levels for the variables first language in the home and persons at home who can finger spell or sign. However, the variable of other hearing impaired family members, which might have had some overlap with the variable etiology-heredity, was analyzed on a yes/no format. So apparently the analysis cannot definitely be assumed to cause a lack of significance for these variables. It is perhaps more likely that their lack of significance for home environment and family members may be a

result of the subjects themselves. These were older students in the institutionalized environment of FSDB where everyone finger spelled and signed. Therefore the school and peer group for these subjects could counteract the effect of the family. These variables might very well be significant if they were included in a similar study with much younger subjects in a different environment.

Number of Years of Attendance at FSDB

This variable was statistically insignificant for all three models. The actual range in years of attendance was 1 - 12 with a mean of 6.6. Therefore this factor alone would suggest that many of the students brought with them an educational background different from that of FSDB.

The earliest level of acceptance at FSDB is around the age of 4 or 5 with perhaps no formal language intervention before this period. The fact that this variable was completely excluded from the Manual BTT model could be a possible argument for its lack of statistical significance relative to performance on the tasks of this investigation. With younger children educated exclusively at FSDB this variable could be significant on the Manual and Graphic BTT.

IQ

IQ was measured on the performance scale of the WISC and was insignificant for all three models. As found by previous researchers there was no significance between IQ and performance on linguistic tasks by the deaf.

Race and Sex

There were 26 white and 4 black subjects of whom 21 were male and 9 were female. Race and sex were not even included for any of the task

models. There is no study to this investigator's knowledge where race and the linguistic ability of the deaf have been found to be correlated.

The performance of the female subjects of this study, unlike that of Cooper's (1967) older deaf females, could not be distinguished from the males' performance. This result could be attributed to a number of variables including the smaller number and narrower age range for female subjects in this study.

Implications for Further Research

1. It has been documented that deaf children of deaf parents have greater scholastic achievement than their deaf peers of hearing parents; however, this study and other research (Kannapell, 1974) have indicated that this initial advantage might not continue for slightly more sophisticated syntactic and morphological structures. There may be a point where ability for more advanced linguistic items no longer gives the deaf child of deaf parents an advantage for performance on traditional English structure.

Therefore it would be of interest to give the Graphic and Manual BTT to younger age groups so that a possible point may be established where these subjects perform at essentially the same level as the older subjects in this study.

2. The Grammatic Closure subtest of the ITPA, which has been found to correlate highly with the BTT, uses real rather than nonsense words and therefore most children perform better on this subtest than on a Berko-type test.

Since the deaf are shown to have difficulty with many abstract forms--as in nonsense words--it would be of interest to see the results

(especially on derived words) if the deaf were given the BTT and also the ITPA subtest.

3. More studies of AMESLAN communication of previously read short prose selections would help better define and isolate those factors which may be rated as important in good AMESLAN communication.

4. An extension of the above study would be a comparison and rating of a written prose passage from memory. This would help indicate if there was a correlation between writing facility in traditional English and FC facility in AMESLAN.

5. Cognitive processing by the deaf has been studied for Piagetian-type tasks, clusterings of nouns, and recall situations. A study of the type cited in item number 3 would obtain cognitive information about the deaf's memory for prose. Models other than the one utilized in this study could be employed and results compared with those found for the hearing population.

6. In all AMESLAN communication tasks it would be easy and perhaps important to note the subject's dB loss in the better ear. If enough information were gathered it would be possible to see if there is any valid correlation of this variable and AMESLAN communication as was found in this study.

Suggestions for Language Intervention

A possible indication for classroom instruction would be the simultaneous presentation of oral, signed English, and graphic stimuli. Naturally the simultaneous graphic presentation would require an electronic device capable of representing words and sentences to the class.

Such an entirely total approach would hopefully

1. help eliminate ambiguities and lost clues due to the fleeting nature of finger spelling and signed English

2. help eliminate any crossover interferences of manual presentations based on English syntax and the AMESLAN communication system

3. utilize the visual medium for maximum concept formation.

Periodic reassessment for specific morphological and syntactical structures would hopefully

1. precisely define deviant areas

2. give information as to types of errors and thus present evidence and insight for possible modification of instructional format.

An emphasis on the positive aspects of bilingual language might be extremely helpful. For example, the students could be capable of performing the same task under two separate conditions--AMESLAN and signed English. This would, in effect, make the student bilingual and more aware of the differences between written English and AMESLAN.

APPENDIX A
SUBJECT PROFILE

There were 30 subjects of whom there were 21 males and 9 females. Of the males 19 were white and 2 were black. There were 7 white and 2 black females.

VARIABLES	
dB Loss	62 - 118 (94.97)
Deafness	birth = 19 prelingual = 11
Performance IQ	95 - 133 (112.53)
Reading Level	1.7 - 9.9 (5.30)
Language in the Home	English = 27 Signs and finger spelling = 2 English, signs, and finger spelling = 1
Age	16 - 18 (17.13)
Finger Spelling Test	93% - 100% correct (98.05)

APPENDIX B
FINGER SPELLING TEST, STUDENT INSTRUCTIONS, PROTOCOL INSTRUCTIONS, AND SCORING SYSTEM

FINGER SPELLING TEST

Student _____ Grade _____

Date of Birth _____

1	BOX	5	4	3	2	1	Total Score _____
2	MAN	5	4	3	2	1	#5 _____
3	HOUSE	5	4	3	2	1	#4 _____
4	FENCE	5	4	3	2	1	#3 _____
5	TREE	5	4	3	2	1	#2 _____
6	MONKEY	5	4	3	2	1	#1 _____
7	CUP	5	4	3	2	1	Examiner _____
8	BASKET	5	4	3	2	1	Date _____
9	CLOWN	5	4	3	2	1	
10	BALLOON	5	4	3	2	1	

11	EATING	5	4	3	2	1	
12	PULLING	5	4	3	2	1	
13	STANDING	5	4	3	2	1	
14	RIDING	5	4	3	2	1	
15	WASHING	5	4	3	2	1	
16	AQUARIUM	5	4	3	2	1	
17	SURF	5	4	3	2	1	
18	CLERK	5	4	3	2	1	
19	LIQUID	5	4	3	2	1	
20	INSTRUMENTS	5	4	3	2	1	
21	HARBOR	5	4	3	2	1	
22	FURNITURE	5	4	3	2	1	

FINGER SPELLING TEST - continued

23	LOCKET	5	4	3	2	1
24	THERMOMETER	5	4	3	2	1
25	PHONOGRAPH	5	4	3	2	1
26	FWKIG	5	4	3	2	1
27	TLUZ	5	4	3	2	1
28	DBRAI	5	4	3	2	1
29	GITWL	5	4	3	2	1
30	HPTG	5	4	3	2	1
31	UOWA	5	4	3	2	1

STUDENT INSTRUCTIONS

I will show you some pictures, and you will finger spell the name. Some of these pictures are very funny. If you do not know the name, I will show you the written name, and you will finger spell this name to me.

PROTOCOL INSTRUCTIONS

The subject is given his instructions in both written and signed English form. Use item no. 1 as a test item. Also show the written word box so that he may know what to expect when he is unable to correctly name the picture. (For the nonsense pictures he must always be shown the name.) Do not penalize if the subject gives an inappropriate response as in "boy" for the desired word "standing." You may ask "What is he doing?" or other questions for the particular picture. However, do not lose too much time with this procedure as the goal of the test is assessment of finger spelling ability. Show the student the written word, allow for an appropriate time for it to be read, and, if necessary, ask again for the desired finger spelled response.

SCORING SYSTEM

Scoring is on a 5 point scale of proficiency with only numbers 5 and 4 as ultimately considered correct.

5 = fluent, smooth, correct flow of letters with no apparent difficulty

4 = labored, hesitant, yet correct flow of letters and/or self-corrections

3 = fluent, smooth flow with only 1 letter incorrect

2 = expressive difficulty and/or approximately one-half of the letters inappropriately used

1 = only 1 letter of the test word used correctly

If any student scores below a 5 on any of the items 1 - 10, then the test may be discontinued at that point, and he may no longer be considered as an appropriate subject for this study.

Passing criteria is a total test score of 75% or above.

APPENDIX C
TEST EXAMPLES, INSTRUCTIONS, AND ANSWER SHEET

TEST EXAMPLES

PLATE III

THIS IS A NAD.

WHO KNOWS HOW TO TROM?

HE IS TROMMING.

HE DID THE SAME THING YESTERDAY.

WHAT DID HE DO YESTERDAY?

YESTERDAY HE _____.

Berry, p. 6

PLATE XIX

THIS IS A TASS.

WHO KNOWS HOW TO GIZZLE?

HE IS GIZZLING.

HE DOES IT EVERYDAY.

EVERYDAY HE _____.

Berry, p. 22

INSTRUCTIONS

The teacher says to the child: "I want to show you some funny pictures. I will tell you something about each picture, and then I want you to help me by finishing the last sentence. This is the way we play the game" (Berry, p. 3). (Demonstrate with Plates I and II.)

ANSWER SHEET

Name _____ Presentation order _____
Hr. of testing _____

WRITTEN PRESENTATION	VISUAL PRESENTATION
Plates	Plates
I _____	I _____
II _____	II _____
III _____	III _____
IV _____	IV _____
V _____	V _____
VI (1) (2) _____	VI (1) (2) _____
VII _____	VII _____
VIII _____	VIII _____
IX _____	IX _____
X _____	X _____
XI _____	XI _____
XII _____	XII _____
XIII _____	XIII _____
XIV _____	XIV _____
XV _____	XV _____
XVI _____	XVI _____
XVII _____	XVII _____
XVIII _____	XVIII _____
XIX _____	XIX _____
XX _____	XX _____
XXI (1) (2) _____	XXI (1) (2) _____

ANSWER SHEET - continued

WRITTEN PRESENTATION			VISUAL PRESENTATION		
Plates			Plates		
XXII			XXII		
XXIII	(1)	(2)	XXIII	(1)	(2)
XXIV	(1)	(2)	XXIV	(1)	(2)
XXV	(1)	(2)	XXV	(1)	(2)
XXVI			XXVI		
XXVII	(1)	(2)	XXVII	(1)	(2)
XXVIII	(1)		XXVIII	(1)	
XXIX	(1)	(2)	XXIX	(1)	(2)
XXX	(1)	(2)	XXX	(1)	(2)

APPENDIX D
SIGNS REVIEWED AND ADDITIONAL INSTRUCTIONS

SIGNS REVIEWED

1. there
2. another
3. knows
4. same
5. thing
6. yesterday
7. house
8. lives
9. what
10. this
11. he
12. do
13. did
14. the

ADDITIONAL INSTRUCTIONS

I will show you a film. Many of the words and pictures are funny. You will watch the TV and afterwards finger spell the answer to me. Some pictures will have only one answer. Other pictures will have two answers. Do not worry if you cannot remember all of the letters. Just try to give an answer for all of the pictures, and remember to be careful about your finger spelling.

APPENDIX E
INSTRUCTIONS AND STORY PARAGRAPH

INSTRUCTIONS

I will give you something to read. Read it. Take your time. Afterwards I will take the paragraph away. You will tell me about what you read. You can speak, you can finger spell, you can sign. You can tell me about the story in any way you want.

STORY PARAGRAPH

Form A-6

Airplane pilots have many important jobs. They fly passengers, freight, and mail from one city to another. Sometimes they make dangerous rescues in land and sea accidents, and drop food where people or herds are starving. They bring strange animals from dense jungles to our zoos. They also serve as traffic police and spot speeding cars on highways.

(Gray, p. 4)

APPENDIX F
INSTRUCTIONS, INSTRUCTIONS FOR SECOND VIEWING, AND FUNCTIONAL COMMUNICATION EVALUATION SHEET

INSTRUCTIONS

You will see a set of 30 stories told by 30 different students. The students will retell a story which they have previously read. You have a copy of this story in front of you. After each story you will have about a minute to fill in the Evaluation Sheet before you. You have 30 numbered sheets. The number on the top of the sheet should correspond to the number that appears on the screen with the student. After a break you will see the film a second time.

There are three parts for the evaluation:

Part A: Quality of Conveyance of the General Concept

Given that you already know what the story was about, how well do you think the overall general concept and basic idea of the paragraph was displayed?

1 = very poor

2 = poor

3 = average

4 = good

5 = very good

Part B: Item Analysis

Read the 17 items. If the entire fact was present, check box no. 3. If the entire fact was not presented, check box no. 2 after each item. If the fact was not presented, check box no. 1 after each item.

INSTRUCTIONS - continued

Part C: Finger Spelling and Sign Ratios

Circle the number which most aptly describes the student's particular style of communicating.

1 = most finger spelling

2 = more finger spelling than signing

3 = equal amounts of finger spelling and signing

4 = more signing than finger spelling

5 = mostly signing

Please circle the number which best describes your own particular knowledge of the student.

INSTRUCTIONS FOR SECOND VIEWING

You will now see the same stories again. You have your own Evaluation Sheets before you. If after seeing a story you wish to change a score, mark the new score with a red pencil. Do not erase your previous score.

FUNCTIONAL COMMUNICATION EVALUATION SHEET

Student No. _____

A. QUALITY OF CONVEYANCE FOR THE GENERAL CONCEPT

1	2	3	4	5
very poor	poor	average	good	very good

B. ITEM ANALYSIS

		1	2	3
1.	Airplane pilots have many jobs	____	____	____
2.	transportation	____	____	____
3.	between cities	____	____	____
4.	of people	____	____	____
5.	of freight	____	____	____
6.	of mail	____	____	____
7.	rescues	____	____	____
8.	at land	____	____	____
9.	at sea	____	____	____
10.	dropping food	____	____	____
11.	to hungry people	____	____	____
12.	to hungry animals	____	____	____
13.	bringing animals to zoos	____	____	____
14.	from the jungles	____	____	____
15.	act as traffic police	____	____	____
16.	spot speeding cars	____	____	____
17.	on the highway	____	____	____

KEY

3 = entire fact presented

2 = fact partially presented

1 = fact omitted

FUNCTIONAL COMMUNICATION EVALUATION SHEET - continued

C. FINGER SPELLING AND SIGNING RATIOS

1 = mostly finger spelling

2 = more finger spelling than signing

3 = nearly equal amounts of finger spelling than signing

4 = more signing than spelling

5 = mostly signing

How well do you know this student?

1	2	3	4	5
not at all				very well

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BIOGRAPHICAL SKETCH

Shannon Maureen Brumfield was born in New Orleans, Louisiana, where she lived with her parents and younger brother and sister--Fred and Mary Kathleen (Kaki). She graduated from Metairie Park Country Day School.

Ms. Brumfield attended Université Laval, Québec, Universidad Ibero-Americana, Mexico City, D.F., Tulane University, New Orleans, and received her Bachelor of Arts degree in Speech Pathology from Louisiana State University, Baton Rouge.

After obtaining her Master of Arts degree in Speech Pathology from Temple University, Philadelphia, she worked for a year for the Upper Darby School District, Upper Darby, Pennsylvania. She returned to New Orleans where, in addition to her administrative duties as rank teacher, she worked with students in a school for the deaf. She had always been interested in language disorders, and it was experience in this environment that made her acutely aware of the unique difficulties of the deaf. She was also an instructor at Our Lady of Holy Cross College where she taught courses in anatomy and physiology of the speech and hearing mechanism and the psychology of deafness.

In September, 1974, she began her doctoral program at the University of Florida where her area of major interest in speech pathology was language disorders in deaf and aphasic populations. This was complemented by a split minor in linguistics and psychology.

Ms. Brumfield has received the Certificate of Clinical Competence in Speech Pathology from the American Speech and Hearing Association, License in Speech Pathology from the State of Louisiana, and is certified by the Council on Education of the Deaf. She also holds teaching certificates for the states of Louisiana and Pennsylvania.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Edward C. Hutchinson, Chairman
Associate Professor of Speech

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Robert J. Scholes, Cochairman
Professor of Speech

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Ira S. Fischler
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This dissertation was submitted to the Graduate Faculty of the Department of Speech in the College of Arts and Sciences and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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